Continuity and Diversity of Courses

The Secondary / Post-Secondary Interface

Project III: Nature of Programs

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A.J.C. King,
December 1976

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Introduction

In the past months a widespread public concern regarding the quality of education in Ontario has become apparent. In particular, many have come to believe that young people entering post-secondary education and/or the world of work lack suitable language and mathematical skills. It is difficult to pinpoint the reasons for the escalating disaffection with current educational practices, or the extent to which the actual process of education in Ontario itself has contributed. Three changes however, are clearly relevant. They are:

(1) The decentralization of educational decision-making, leading to variability in what is taught and how students are evaluated;

(2) A decline in the population of school-age children, leading to strains among teachers and across institutions that are now competing for scarce human and financial resources;

(3) An increased emphasis in schools on the personal development of the individual student, shifting the emphasis in the schools away from the needs of society.

These events have taken place at a time when the proportionate costs of education are increasing and this tends to encourage the public to see educational deficiencies in terms of costs. The introduction of schools, courses, and programs for French-speaking students has added further complexity to the situation.

The purpose of the Project III phase of the Interface Study was to examine the relationship between courses at the secondary and post-secondary levels. Two interfaces were defined: between secondary school and year 1 college of applied arts and technology courses; and between year 5 secondary school and year 1 university courses.

In its simplest terms, this investigation is concerned with variability in what is taught, and how it is taught and its effect upon continuity: the relationship between subjects taught in consecutive years. More specifically, the research attempts to respond to the following questions:

(1) Are there gaps in content covered and/or inconsistencies in the level of competence aimed at in the teaching of subjects that lead to poor preparation of students for the next level of education?

(2) Are there duplications in content covered and/or inconsistencies in the level of competence aimed at in the teaching of subjects across two institutional levels that lead to poor time economies?

(3) If there are gaps and/or duplications in subject content, what form do they take and how significant are they?

(4) Over the past ten years, what trends are visible in course and program enrolments and student achievement, and what factors explain these trends?

(5) What provisions are presently made for coordinating curricula and standards of achievement in particular subjects within and across the educational institutions under investigation?

Methodology

The major task of Project III was to describe in detail the characteristics of a pool of similar courses on each side of an interface and then examine the consequences that ensue for both students and instructors, when students proceed through these courses which form the interface. To keep the study within reasonable limits of time and magnitude the following subjects were selected for study: English, Anglais, Français, French, History, Histoire, Physics, Physique, Mathematics, and Mathematiques (French, Anglais, History and Histoire were investigated only across the year 5 secondary school and year 1 university interface).

A sample of 53 English-language and 14 French-language (including "mixed") secondary schools was drawn; 15 colleges and 11 universities were selected as representative of post-secondary institutions. The total number of courses offered by these institutions in the subjects and years

under study formed the population of courses; from each population a sample of courses was drawn on the basis of criteria such as enrolment, and similarity to courses offered at equivalent institutions.

Questionnaires, filled out by instructors in the sample of French and English secondary schools, colleges and universities, formed a major source of information for the development of course descriptions. In addition, department chairmen and registrars at universities and colleges and secondary school department heads were interviewed in order to obtain perceptions of the changes that had taken place over the past ten years. Requests for institutional calendars, courses of study and evaluation instruments over the past ten years were made with the same intent. Program and course enrolments and records of student achievement were analysed to determine whether changes had occurred in these two areas.

Rating validation instruments were developed in English, French and Mathematics for the purpose of assessing the validity of the rating scales that respondents (to the questionnaires) used to estimate "average student competence". The analysis of the responses to the rating validation instruments indicated that there were significant differences in the use of the rating scales by instructors across particular subject interfaces; appropriate adjustments in interpretation were made.

The findings in each subject are summarized in the following sections. The approach is first to describe the extent of variability in content and level of competence in the pool of courses for each subject at all institutional levels and then to analyze the extent to which there exists across two institutional levels, gaps (material not taught at one level but required for the next) and duplications (material taught at both institutional levels).

There is a brief statement about the current status of subject coordination across the province and a summary of trends in student achievement, course and program enrolments, and post-secondary admission policies.

THE YEAR 4 SECONDARY SCHOOL TO YEAR 1 COLLEGE INTERFACE

The student population in a college English course is heterogeneous. Most students are graduates from year 4 general English courses, some have year 4 advanced English or year 5 English, others have the equivalent of a year 4 secondary school diploma without a year 4 English course and a few do not speak English as a first language. It was, therefore, not surprising that most college instructors (87 percent) found a great deal of variation in the competencies of their incoming students. It is perhaps less easy to perceive the reasons that led 82 percent of year 4 general and 65 percent of year 4 advanced teachers also to indicate great variation in the competencies of their incoming students. Instructors appear to be as dissatisfied with the level of competence of the students entering their courses as they are struck by the variable preparation of those students. Over 60 percent of the year 4 and college teachers indicated that they would prefer a higher level of competence at entry for their students in most areas. In fact, a third to one half of the year 4 teachers and college instructors were highly dissatisfied with the level of student competence at entry. Reading and essay writing are the areas in which teachers at both levels claimed the greatest improvement was needed.

The year 4 general and advanced level courses varied in content from one school to the next but over 70 percent of the courses sampled could be described as combinations of literature and composition. The approach to literature varied: some used a variety of approaches or organizing theme, others a single approach (EXAMPLE: by genre or theme). The composition component consisted of varying mixtures of formal essay writing, creative and/or practical writing. First-semester college courses, typically offered in Business, Technology and General Arts/Liberal Studies divisions, were primarily concerned with the development of oral and written communication skills.

The mismatch between the two levels that this implies tends to be confirmed by another piece of evidence: in the year 4 secondary school and college courses, where aims might be expected to be generally congruent, we found one notable dissimilarity. Year 4 teachers emphasized "the universal elements in human experience through the study of literature" and "appreciation

of literature", but the college teachers considered the literature aspect of English unimportant.

Unless more specific requirements are established for entry into college programs it will be essential for the colleges to retain a variety of procedures to accommodate the tremendous differences in abilities of incoming students.

THE YEAR 5 SECONDARY SCHOOL TO YEAR 1 UNIVERSITY INTERFACE

English is not a discipline in which one can precisely identify gaps and duplications at the year 5 secondary - year 1 university interface. The subject is rarely broken down into specific, testable objectives. Furthermore, most instructors see literature as the medium through which language skills are developed. Language development is viewed as a long-term process reinforced in successive years through literature study.

Most of the year 5 English courses offered in the sample of schools were described as combinations of literature and composition. About half used a variety of organizational approaches to literature; the composition component consisted of essay writing mostly based on the literature content. The others utilized a single approach to literature (EXAMPLE: studying specific genres or themes); in these the composition component took the form of more general essay or creative writing. The most common type of first year university English course offered and surveyed was the general survey of English literature organized historically and/or by theme and genre. At both levels the instructional approach was, broadly speaking, similar: close to 80 percent of instructors taught the analysis of literature through an examination of its characteristics, the application of a critical vocabulary in the evaluation of the range, nature and quality of particular works, and the writing of literary critiques. Eighty-five percent of them spent between half and all of their formal instruction time on the teaching of literature.

At both levels, writing and reading were declared to be important aims but less formal instruction time was devoted to the development of these language skills than to literature - 92 percent of year 5 teachers spent less than 40 percent of the time and 65 percent of university instructors less than 20 percent of the time on these objectives. While

conceding that more attention is required for language and composition, secondary school teachers claimed that with the reduction of teaching periods from 7 or 8 to 5 in the credit system, time spent on composition (previously allotted 3 periods a week; now cut down to one in most schools), including language work and writing, has been severely curtailed.

The majority of teachers at both the year 5 secondary school and year 1 university level indicated that there was a great deal of variation in knowledge and level of preparation among incoming students. This variability is more pronounced at the university level, for students with differing backgrounds in English enter from many secondary schools. Teachers were also highly critical of the general preparation of their incoming students, and close to 70 percent expressed dissatisfaction with preparation in all principal literature, writing and reading objectives. In particular, it is noteworthy that teachers of year 5 courses consistently assigned lower ratings of competence to their incoming students than year 4 advanced teachers attributed to their graduates. Similarly, year 1 university instructors expressed a much lower opinion of the English abilities of year 5 graduates than did the year 5 secondary school teachers. The high degree of variability in the background of university freshmen undoubtedly contributed to the low level of competence perceived. However, the university instructors' strong criticism of the preparation of students in basic English skills may well be a consequence of the reduced amount of time given to the development of those skills in secondary schools as well as the diversity of approaches taken in seconday school English courses.

Teachers at both institutional levels were aiming at the same objectives in their courses, but this does not necessarily mean that duplication in content exists: the teaching of English is concerned with the development of skills more than it is with the acquisition of a body of knowledge. To be sure, university instructors do consider that incoming students are not being adequately prepared in certain areas, but those areas where there are gaps that need scrutiny appear to lie primarily in the language development of the student.

YEAR 5 ANGLAIS

In almost all the 14 secondary schools included in the Francophone sample, Anglais courses greatly resembled English courses. Mostly they consisted of combinations of literature and composition, with half of the teachers reporting that literature received over 40 percent of class time. All but one of the teachers spent less than 20 percent of class time on language skills, except for writing, where 5 of the 14 teachers declared they spent more than 20 percent of class time. It is, therefore, not surprising that teachers reported very slight gains in language achievement on completion of the course.

Most of the year 5 Anglais teachers found a great deal of variation in the competencies of their incoming students and over half were dissatisfied with their level of competence in almost half of the areas of concentration. Teachers also made a low assessment of the average level of students' competence on exit from their courses.

We investigated the Anglais situation at two bilingual universities. Fewer than one percent of Franco-Ontarian students need to take the English-as-a-second-language (ESL) course offered at one university; the other university has not perceived a need to teach a separate ESL course in year 1 English. Thus, one may describe the interface from year 5 Anglais at secondary school to year 1 university as virtually nonexistent. Those Francophone studnets who proceed from year 5 Anglais to year 1 university are functionally bilingual: they appear to take English, when necessary, along with English-speaking students.

French

The diagnosis of problems which might occur between French in year 5 and French as taught in the universities is rendered difficult by the diffuseness of the interface between them. About one school in three offered year 5 French at two levels of difficulty, and the universities offered it at several levels.

Students may go into courses at the universities with backgrounds in French ranging from minimal experience to 5 years of French at secondary school. Normally a student does not take a course which is designed for someone well below his presumed level of competence. On the other hand, many of the elementary university courses do not have restrictions on entry, and the possibility of a student taking a university course at a level which he has already covered is very real. In fact, one of the most interesting points noted in the study bears on this issue. A group of 8 university instructors reporting on courses which did not have year 5 prerequisites gave essentially the same competence rating to their incoming students as did the 12 instructors reporting on courses which had such a requirement. With so small a sample the conclusions ought to be tentative, but, the data suggest that the streaming of students from secondary school courses into university courses is casual and that the potential for gaps and duplications in course content is considerable.

The situation just described could contribute a good deal toward providing a heterogeneous group of students in the universities. This heterogeneity was widely recognized and often deplored by both university and secondary school teachers. Problems of variability in the secondary schools must, however, have another basis since the secondary schools maintain quite a strict system of prerequisites. The principal cause of variability there seems to be the differences in standards which appear to be chiefly expressed through the decision of some teachers to spend a good deal of time on cultural, literary or dramatic affairs when other teachers would consider the students still lacking the basic language requirements for profitable excursions into these fields.

The data gathered on emphasis on grammar, vocabulary, writing, reading and speaking, in almost all courses, together with data on the similarity between university and secondary school teachers' assessments of a set of sample questions and student answers, give us reason to believe that a fairly precise step-by-step program in French could be designed and accepted. However, there is not now a system of standardization which satisfies any of the groups of teachers.

There are, of course, differences in the way French is taught, in the relative emphasis given to final examinations and to term marks. There are also significant differences in the emphasis given to certain objectives. In all these areas there appears, however, to be a measure of consistency, with a small percentage choosing to go a route rather far from that of their colleagues. To what extent this is simply a desirable expression of academic freedom and to what extent it is due to inadequate coordination must be answered by more detailed analysis of specific courses. The coordination system for the discipline may well have to be strengthened if the concerns of many teachers regarding variability are to be met, and the concerns of society regarding excessive overlaps between institutions are to be satisfactorily resolved.

History and Histoire

Year 5 secondary school history and histoire are presented in most schools as Canadian or North American history courses. The organization of the course is often thematic; alternatively, a series of problems may be studied. Neither approach is unexpected since both are suggested in the Ministry of Education guidelines for senior history/histoire. Courses offered in university year 1 are predominantly European survey courses, though most universities offer at least one other type (a few deal with Canadian history).

Instructors appear to be concerned more with the skills developed than content learned, and at both levels they are agreed on the nature of those skills--both general communication skills and skills specific to the analysis and interpretation of historical information. However,

instructors at both levels perceived incoming students' competence in those skill areas as very low, and variability in students' background as very great. Since Year 1 university history and histoire courses rarely have prerequisites, it is likely that the members of each university class do not have comparable backgrounds in history. This variability has undoubtedly been more striking since the introduction of the credit system. Before then, a more uniform structure at secondary school guaranteed some history background from courses taken in grades 9-12, even if the incoming university student had not taken grade 13 history. University instructors can no longer assume that incoming students will have command of a rather uniform body of historical knowledge or even of certain basic historical skills.

The variation in competence and preparation of students entering university histoire courses is increased by two other factors: few year 5 courses contain a prerequisite, and university histoire courses appear to serve a considerable proportion of graduates from Quebec schools, with a different background in histoire from that provided by Ontario secondary schools.

In year 5 history the problem of variability should be less, since 66 percent of the courses required or recommended at least one previous history course, unlike year 5 histoire. Teachers of both history and histoire, however, perceived a great deal of variability in the competence of students in their courses. This perceived variability may explain the low average level of student competence indicated by these instructors.

In both the history and histoire interfaces it is clear that the great variability in the background of students enrolled in year 5 secondary school and year 1 university courses hinders any continuity in the teaching of students moving from one level to the other. The issue is further complicated by a lack of coordination between university and secondary school instructors in the design of curricula. Since history and histoire instructors at all levels are agreed about what is to be taught, it would seem advantageous if they also agreed on what degree of competence should be achieved at each educational level; in this way a continuum in the teaching of history skills could be developed and gaps and unnecessary duplications could be avoided.

THE YEAR 3 SECONDARY SCHOOL TO YEAR 1 COLLEGE INTERFACE

Secondary school students entering college physics courses have a heterogeneous background. Students may have taken year 3 general or year 3 advanced physics courses, or no formal physics at all. A small percentage of students enrolled in college technology programs may have taken year 5 physics. The problem is exacerbated by the absence of Ministry guidelines for year 3 general physics courses. Perhaps inevitably, then, year 3 general Physics and Physique courses had the lowest consistency of content coverage and emphasis from school to school. The year 3 advanced physics and physique courses showed greater consistency of content coverage, but it is from year 3 general courses that the colleges receive many of their physics students.

The situation in the colleges compounds the problem. Although most college courses prescribe year 3 physics and a secondary school mathematics, such requirements are often waived. There are a great variety of college physics courses offered; in many instances there appears to be a specific physics course for each technology or technician field offered in a college. Since there are no province-wide curricula, the physics instructor plays a major role in determining the content of the course. Variability in instructors' work and educational backgrounds contributes to the variability in course content. Not surprisingly, year 1 college Physics/Physique courses have a low degree of consistency of content coverage. Related to all these factors, it appears, is the very low rating given by college instructors to the average students' level of achievement at entry to their courses.

It would, indeed, be true to say that the year 3 secondary school to year 1 college interface hardly exists. What interface there is, is primarily one of accommodation, in that students with a wide range of secondary school backgrounds are accepted into college courses. The interface is inefficient, in that it appears as if much of the material which is taught in year 3 is taught again in year 1 college courses.

The extent to which a better match between the two levels can be achieved presents both philosophical and practical problems. The philosophical aspects of restricting admission to students who have taken and passed specific courses are beyond the scope of this discussion. Whether such a procedure would produce a better interface, given the wide variety and number of first year physics courses offered in colleges, is a moot question. Certainly, the preparation of updated curriculum guidelines for both year 3 Physics/Physique courses, on the basis of joint consultation between secondary school and college instructors, would be a first step in the improvement of the interface. An agreed core curriculum for year 3 courses would lead to increased consistency in the coverage of appropriate topics in high school, and a correspondingly higher level of student achievement in these core topics on entry to college physics courses. Exclusion from college physics/physique courses of students who did not take year 3 courses probably is not acceptable, but one alternative is to screen students on the basis of formal prerequisites and/or demonstrated mastery of subject matter and then to offer remedial work to those who do not meet appropriate standards.

THE YEAR 5 SECONDARY SCHOOL TO YEAR 1 UNIVERSITY INTERFACE

The university-secondary school physics interface is something of a contradiction. On the one hand, year 5 teachers provided descriptions of courses which appeared to be highly consistent from one school to the next, and expressed relatively high satisfaction with the level of student achievement at entry. An analysis of the percentage of teachers teaching individual topics and of the time allocated to each of 21 major topic areas confirmed the consistency. In addition, the same text was widely used across the schools sampled.

The pattern was somewhat different for the year 5 Physique courses. The teachers generally tended to place more emphasis on mechanics topics in their teaching; but there was greater overall variability in content coverage, and in the entry and exit levels of achievement.

On the other hand year 1 Physics instructors at university perceived great variability in the knowledge possessed by students entering their courses, and expressed a relatively high level of dissatisfaction with their level of competence. They were also unhappy with the mathematical skills displayed by incoming students. Moreover, in universities there appear to be two distinct types of physics courses, those for 'majors' and those for 'others' - a factor to which one may in some degree attribute the only moderate consistency of content coverage that appeared in first year physics courses.

When university physics instructors' expectations were highest, i.e., in topics which they perceived as being widely taught in the secondary schools, their satisfaction with the student achievement level at entry tends to be lowest and the discrepancy between achievement level perceived by secondary school teachers and university instructors tends to be greatest. Although the university year 1 Physique courses tended to be French-instruction versions of year 1 Physics courses, the emphasis on mechanics in the secondary schools no doubt facilitated the transition for some Frech-speaking students.

There appear to be no real barriers to an improved relationship between year 5 and university year 1 Physics/Physique because the students who are taking year 5 Physics or Physique, for the most part, are students with specific post-secondary aspirations who anticipate that they will be taking first year physics at university. The incidence of students taking major or other physics courses in year 1 university without appropriate year 5 Physics requirements was low. An analysis of the perceived student achievement level in major and other courses indicates that there are de facto prerequisites in all these courses in most universities. First year university courses in physics and physique do not, therefore, face the problem that perplexes other subjects, of having to accommodate a substantial number of students who wish to study the discipline without appropriate secondary school preparation. It probably would be useful, however, if the universities were more specific about defining the prerequisites for their physics/physique offerings.

A number of steps could be taken to improve the university secondary school interface in physics and physique. The first issue--the nature of the body of knowledge required for the year 5 courses--may not be as easily resolved as one might think: the variance in the content of university physics and physique courses sampled in the study makes it obvious that the year 5 physics courses could not assure some level of competence in year 5 students for all the topics covered in year 1 university physics courses.

Second, it appears that the current year 5 curriculum guideline covers too much ground to ensure the level of competency which the universities would like. Although the year 5 teachers appear to cover the greater part of the material outlined in the Ministry of Education guideline, it is conceded that many of these topics are not covered at the depth desirable for entry to a university physics course. There seems to be a need, therefore, for a narrowing of the core content in year 5 Physics and Physique and for more specific agreement about the level of difficulty at which the year 5 teachers should cover the topics in the core. There seems to be some resentment in the secondary schools about the fact that the Ministry of Education has not made any steps to update the curriculum guideline for year 5 Physics since 1966. Some department heads interviewed believed the Ministry had abdicated its responsibilities here.

Third, the mathematical skills which students need to master the physics content in year 5 and first year university physics constitute an area of ambiguity. Although there was a fairly high degree of agreement about what mathematical skills are necessary, these skills need to be defined carefully by appropriate university and secondary school personnel. The matter of exactly where and how the physics student is to acquire these necessary mathematical skills also needs to be resolved. The year 5 Physics and Physique teachers indicated that they did not specifically teach these skills except in so far as they were needed to solve particular problems in their courses. Coordination, therefore, is needed between physics and mathematics in the secondary schools to ensure that students who are taking physics do get the appropriate mathematical training.

Fourth, the level of competence achieved by typical students entering year 1 university Physics and Physique courses needs more accurate identification. University professors tend to assume that this is low, when in fact tests administered by Project II of the Interface study indicate that in some instances students do have a reasonable level of competency. The natural tendency to look to the low quarter of the entering students to assess the average level of achievement probably means that that level in year 1 university Physics/Physique courses is being underestimated by the university instructors.

Mathematics and Mathématiques

THE YEAR 4 SECONDARY SCHOOL TO YEAR 1 COLLEGE INTERFACE

The transition of students from year 4 secondary school to mathematics courses in the colleges is confounded by a variety of factors. Graduates of year 4 advanced, general, technical and business mathematics courses (as well as a small percentage of year 5 Mathematics students) may be found in the many, varied first-semester college mathematics courses. The year 4 general Mathematics courses studied were characterized by variability in topics and emphases, with few topics being taught by a majority of teachers. Basic Algebra received the greatest emphasis, with Basic Mathematics and basic topics in quadratic, exponential and logarithmic functions also given some attention. The year 4 advanced courses were taught with much greater consistency. Twenty-two of the 36 topics defined by the Ministry as "core" were taught by all instructors in our sample and a greater number of instructors than in year 4 general Mathematics covered individual topics in each topic area. The major content areas covered included quadratic and trigonometric functions, and analytical geometry. Both year 4 general and advanced Mathématiques were more consistently taught than the equivalent mathematics courses, although the general pattern was very similar.

The year 1 college Business and Technology Mathematics courses which primarily receive year 4 graduates also exhibited wide variability in content and emphasis. The two groups of courses differ considerably, Technology Mathematics being more concerned with the preparation of students for advanced levels of theoretical and applied mathematical work. The primary emphasis in college business courses was on arithmetic although there was some attention given to algebraic topics. College technology courses focussed mainly on Basic Algebra and the various kinds of functions, with considerable weight placed on trigonometry and some basic arithmetic. There was considerable variation from course to course in the other topics that were taught. The content and emphasis of our small sample of Mathématiques courses (all in the Technology area) were essentially the same as the English equivalents; the instructors were equally critical of incoming students' preparation in basic mathematical skills.

Criticism centred on the fact that graduates of year 4 general courses were perceived as unable to do basic mathematics. Upgrading opportunities as well as review of basic concepts in elementary arithmetic and algebra were provided by the colleges. This was the case in both Technology and Business Mathematics courses, even though 84 percent of the Technology courses required successful completion of year 4 mathematics (only 43 percent of Business Mathematics courses specified prerequisites at the year 4 secondary level).

Information concerning the amount of time allocated to specific topics, the amount of time spent in review and coverage of topics combines to give the impression that Basic Mathematics does not appear to have been taught adequately by the end of year 4. College instructors perceived a lower level of competence among their incoming students than year 4 teachers considered their students generally achieved. There were some marked differences in the responses, however. Year 4 advanced teachers and college technology instructors indicated that at entry into their courses, students had achieved greater competence than year 4 general and college business instructors indicated for their students.

There are many explanations for college instructors' perceptions of students' inadequacies. For example, there are topics which formed part of the core of year 4 advanced Mathematics and Mathématiques courses, yet were not included as the core in year 4 general courses; college instructors expected a certain level of competence among all incoming students in specific topic areas (for instance, in analytic geometry, they might expect knowledge of derivation of various forms of the equation, and of identifying, constructing and graphing a straight line) and they must inevitably be disappointed since these key topics are not included in the year 4 general core. Project II analyses of data based on the testing of year 4 students in fundamental arithmetic operations, percentages, generalized arithmetic, working with algebraic expressions, linear equations and problems involving one unknown revealed minor gaps in 4 of these 5 areas. Other topics are identified as core topics in guidelines but were not taught. For example, "quadratic equations" was a core item in the year 4 general course, but was taught by only 32 percent of the teachers.

It is perhaps more difficult to understand why students' competence is perceived as inadequate in topics taught by most teachers. The 5 areas of Basic Arithmetic and Algebra mentioned above were taught by at least 58 percent of year 4 teachers. In addition, these topics formed part of mathematics courses before year 4.

It is clear that the topics mentioned above are so basic that attention should be given to the discrepancies revealed.

THE YEAR 5 SECONDARY SCHOOL TO YEAR 1 UNIVERSITY INTERFACE

Although 75 percent of university mathematics courses in Calculus, Algebra, Calculus and Linear Algebra, and Basic Mathematics required successful completion of year 5 secondary school mathematics course(s), information from instructors at both levels indicated that there was considerable duplication of material. This is particularly true in Calculus, where year 5 teachers allocated approximately 40 percent of their time to university year 1 topics, and university instructors allocated about 30 percent of their time to year 5 topics. The phenomenon occurred to a lesser extent for algebra courses: in 3 of the 5 studied between 25 and 45 percent of time was spent on year 5 topics,

although year 5 teachers allocated less than 5 percent of the time to university topics. Some emphasis was given to year 5 topics by most university instructors; for example, an average of 30 percent of class time was given over to Basic Mathematics in Calculus courses and between one-quarter and one-half of class time in courses combining Calculus and Linear Algebra.

Year 5 Mathématiques courses showed less variability than their English counterparts. This greater degree of uniformity was achieved by a closer adherence to Ministry of Education guidelines and greater use of final examinations.

University instructors in general, including the very small sample of mathématiques instructors were critical of the general level of preparation of incoming students in basic mathematics skills.

Calculus instructors in particular were dissatisfied, especially with the 4 topic areas identified as gaps by the Project II testing program. Some dissatisfaction was also evidenced for 4 of the 6 topic areas identified there as duplications. This might be explained by the fact that these topic areas relate to basic differentiation and are considered to be the "basic arithmetic" of Calculus. Hence, the desired level of entry competence is likely to be high.

Except for year 4 general Mathematics and year 5 Calculus/ Calcul there was considerable consistency in the teaching of mathematics and mathématiques at the senior secondary school level across the province. It was not then, surprising that the Project II mathematics testing program found little evidence of declining student achievement in mathematics over the past five years. Nevertheless, diversity in what is taught does appear to be increasing and there are gaps and duplications across the interface that require coordination.

THE YEAR 4 SECONDARY SCHOOL TO YEAR 1 COLLEGE INTERFACE

Only one college offers opportunities for French-speaking students to take entire programs with French as the language of instruction. Two others offer limited opportunities.

The majority of entering students come from year 4 générale or avancé français courses in Ontario's French or "mixed" secondary schools. While there is greater attention given to language instruction in these year 4 courses than in their English counterparts, the criticisms by college instructors regarding the preparation of incoming students was just as extensive. There was some confusion in the data regarding the preparation of students prior to entry into the year 4 course; while the general impression was one of satisfaction there were many criticisms and concerns about student preparation in specific areas particularly with regard to language development.

The français courses offered in the college tend to be very flexible and students are normally tested and then placed in a program that is consistent with their competence. While this approach deals quite effectively with the accommodation of students with a wide range of backgrounds in français, the college instructors would prefer to receive students who possess substantially higher levels of competence than incoming students at the present time.

THE YEAR 5 SECONDARY SCHOOL TO YEAR 1 UNIVERSITY INTERFACE

The majority of students enrolled in year 1 university français courses have taken the subject in their last year of secondary school or its equivalent. In Ontario, Ministry of Education guidelines are not a major source of direction for year 5 teachers nor is there great consistency in the use of particular textbooks. It is, therefore, not surprising to find quite different emphases from course to course. However, instruction in language development is usually the basic thrust (60 percent of most courses) with instruction in literature ranging from 25 to 45 percent of class time. The year 5 teachers were more critical

of the preparation of incoming students than were the year 4 teachers. Although the main criticisms were related to language skills most instructors indicated a preference for a higher level of student competence at entry to their courses in all areas.

The six university français instructors almost unanimously declared that first year students' preparation was weak in the area of writing and ability to undertake literary study. Many more français courses offered at the university level dealt specifically with language development than was the case for English courses. In these courses (often after a pretest) a student is usually provided with an opportunity to upgrade his language skills. The concept of "remediation" is much more acceptable to the français departments of universities than to English departments.

In general, year 1 français instructors at universities perceive their incoming students as being ill-prepared.

Nevertheless, it should be pointed out that schools, courses, and programs for French-speaking students in Ontario are relatively new. This newness means the necessary period of trial and error in course and program development has only begun. More time is required before some stability can be achieved. Also there is the de facto requirement that French-speaking students must be functionally bilingual in Ontario; this places an added burden on their time and efforts.

Trends

ENROLMENTS

Although enrolments at both secondary and post-secondary institutions have grown dramatically since the early 1960s, the growth rate at colleges and universities has slowed down after reaching a peak in the early 1970s. At secondary schools enrolments have dipped and it is anticipated that the decline will continue. Surprisingly, perhaps, there has been a decline in the holding power of secondary schools up to the year 4 level since the introduction of the credit system.

The pattern of changing enrolments over time in specific courses at the secondary and university level tends to be substantiated by the reasons for course selection given in an earlier study (Semestering the Secondary School, King et al., OISE, 1975). Mathematics and science enrolments have remained quite stable; students select such courses because they are necessary for future career and study plans. Most students take English up to year 4 for the same reason; however, until just recently English year 5 was not a prerequisite for many university programs, and this is reflected in a slight decline in year 5 English enrolments. Students select other subjects, such as French, history and home economics, in part because of interest. "Interest" subjects such as French and history which may involve a high risk of failure for students have experienced a decline in enrolments; "interest" subjects such as home economics and theatre arts which students perceive as low risk, have increased in enrolment.

College enrolments in all program areas have generally increased steadily since 1970. The introduction of nursing and related programs in 1973 increased enrolments greatly in the health sciences area. An increase in two-year programs at colleges generally is explained in part by consolidation of some three-year programs into two.

Program enrolments at both colleges and universities appear to be influenced to some extent by the economic situation and the extent to which job opportunities are available. Thus proportionate enrolments in Arts and Science at universities have decreased since 1972; it is more difficult for the graduate with a general B.A. to obtain work. Other factors obviously contribute as well. Enrolments in the health professions have not grown as rapidly as in other fields, perhaps because of more restrictive admissions policies.

STUDENT ACHIEVEMENT

At secondary schools, since the abolition of the grade 13 Departmental examinations, year 5 failure rates have decreased and the proportion of students receiving higher marks has increased. This pattern may also be detected in year 4 advanced courses; however, in the earlier years of secondary school and in year 4 general courses, failure rates have

remained at pre-credit-system levels and the proportion of higher marks assigned has changed very little. For students enrolling in mainly general courses in year 1 of secondary school the likelihood of dropping out before receiving a secondary school graduation diploma (SSGD) is very high and the likelihood of continuing to college is very low.

Although courses in some universities show a tendency toward inflation of marks, the pattern is not consistent across all universities. In addition, the variability in mark patterns at university reflects recent pressures in some universities to introduce evaluation policies to control marks inflation. In some university courses failure rates have declined over the past ten years; the proportion of students receiving A's has increased.

Attempts to obtain information concerning student achievement in particular courses in the colleges were unsuccessful, owing to the great variety of procedures used to evaluate students and the almost complete absence of summarized data. However, course supervisors who were interviewed noted that although student attitude and motivation had improved, mathematics and English skills had declined.

The assignment of advanced credits or standing to students rarely takes place in universities, but occurs extensively in the colleges. College students may obtain credit for equivalent courses taken in year 5, another college or university. If enough advanced credits are obtained the student is permitted to enter a program beyond the first semester. The number of college students receiving advanced credits has increased from 3.1 percent in 1970 to 9.7 percent in 1974. Colleges are now perceived as a legitimate post-secondary alternative, and more students with year 5 credits are applying.

ADMISSION POLICIES

Although the basic admission requirements for entry into post-secondary college programs is the SSGD, 'refinements' have been added where programs are oversubscribed. These refinements vary from college to college but include the following: raising the percentage required for admission to certain subjects; psychological and aptitude testing; group and/or

personal interviews; and priority given to students residing in the community served by the college.

Admission requirements at universities have been influenced by changes in the secondary school system. In 1965, the minimum requirement was 60 percent on 9 examination papers; many secondary school subjects were required, not optional. As the number of credits required for a SSHGD decreased, entrance requirements at universities were altered and became less subject-specific. English was dropped as a prerequisite for many programs by 1974, although it has recently been reinstated in a number of them. Universities are tending to be more specific regarding the year 5 courses required for entry into particular programs.

Remedial courses are normally not labelled as such at colleges; however, there is a remedial component of many first-semester courses. Although there is concern about the level of competence of incoming students at universities, only a few offer remedial courses. Every university surveyed does, nonetheless, provide opportunities for assistance to students with academic problems.

Coordinating Mechanisms

On the basis of two surveys (one formal and covering nearly 2,000 persons, the other informal but more detailed and specialized) administered to instructors at the secondary school, college and university levels, two categories of coordinating mechanisms were developed. One category included mechanisms for coordination within each discipline; the other, mechanisms for coordination across institutional levels. "Coordination" was defined in the context of such activities as choosing appropriate methods and materials for study and determining standards to be achieved by students.

The most striking findings from this analysis were: (1) the vast majority of the mechanisms mentioned were voluntary and informal; (2) the average number of mechanisms suggested per instructor was 1.2 (covering both discipline-specific and inter-institutional areas) and

(3) no single mechanism was mentioned by as many as 10 percent of the respondents.

While the guidance departments of the schools and the liaison and promotion departments of the universities were most frequently mentioned, their influence on the system must be questioned if these departments are mentioned by less than 10 percent of those responding. The coordination done by these departments, however valuable it may be, is not of much comfort to those concerned with curriculum planning and student evaluation, since these are not the functions of such departments.

Indeed, if one takes out those formal units in schools and universities which provide general liaison, there is essentially nothing left of a formal coordinating system. What is done, is done by modestly financed voluntary organizations such as the science or mathematics teachers associations and the remnants of consultant and advisory teams from the Ministry of Education and Boards of Education.

From the interviews it is clear that some of these associations have made enormous contributions in relation to their resources. However, if one assumes that coordination must involve each teacher, then the present coordination system must be judged haphazard and inefficient.

The surveys showed a system both too limited in total resources and too diffuse to be functional. Yet it by no means follows that a swing to a strongly centralized and potentially bureaucratic coordination system is necessary. A centralized coordination system can be unresponsive to individual and community needs. Although there is evidence of competent work being done at the level of school, board and subject association, there is a clear need for a more efficient system of coordination which still has the capacity to support some diversity of effort.

Concluding Statement

Much of our data may be inexact because they are dependent on perceptions of individual educators. These perceptions have undoubtedly been distorted in some instances by the climate of educational criticism that

exists in Ontario at the present time. However, we have combined this perceptual information with concrete information from reliable sources to produce findings in which we have considerable confidence.

(1) The colleges successfully make accommodation for the great variability in the preparation of their incoming students. This variability of preparation is a natural concomitant of the credit system and the "open door" policy of the colleges.

(2) Inflation of marks has not been substantial in years 1 to 4 in secondary school. An increase in failure rates precipitated by the perceived necessity to "improve standards" could reduce even further the rather shaky holding power of the secondary schools, especially for the general level student.

(3) Inflation of marks has occurred to some extent in year 5 secondary school but is manifested in an increase in the number of higher marks being assigned rather than declining failure rates. Failure rates declined substantially with the removal of external examinations but have remained quite stable for the past 7 years. The balance between university candidates and university capacity is quite tenuous at the present and a tightening of "standards" (translated in practice to mean higher failure rates) could empty classrooms in some universities.

(4) Inflation of marks has occurred in some universities: substantial variations in student mark distributions over time were found within and across universities.

(5) There is evidence of diversity in what is being taught in secondary school courses and the level of competence at which teaching is aimed. Diversity is greatest in general level courses and least in such areas as year 5 Mathematics and Physics. This diversity has led to "the better students being better than ever" but also to increased heterogeneity in the composition of classes at both the secondary and post-secondary levels. This heterogeneity combined with flexible course admission policies has made the task of the teacher more difficult and his criticisms more severe.

(6) There is need for a thorough evaluation of the current status of educational opportunities for French-speaking students in secondary and post-secondary institutions in Ontario.

(7) Subject coordination across institutions and across institutional levels at the interface is almost nonexistent. Although in many instances effective courses have been developed, this lack of coordination has created uncertainty and discontent among educators.

Clearly, problems exist which cannot be resolved by applying "band-aid" solutions. In response to current innovations and Ministry of Education policy changes some secondary school students have been subjected to major educational changes for five consecutive years. A comprehensive, systematically designed plan with precise long-term goals is now necessary.

1 Introduction

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INTRODUCTION

The Purpose of the Study

This study was initiated by the Ontario Ministries of Colleges and Universities and Education. The justification for the study from the Ministries' point of view is as follows:

> "There is public and professional concern over secondary education and post-secondary education and the co-ordination between them. The concern includes, among other matters, appropriate achievement, the nature and extent of diversity amongst students and programs, the possible duplication of programs, the measurement of student abilities and progress, and present post-secondary admission policies and practices.
> Consequently, the Ministers of Education and of Colleges and Universities consider it advisable at this time to review those government policies which affect the relationship and co-ordination of secondary and post-secondary programs, the progress of students through them, and the criteria upon which the post-secondary admissions are based."

However, the study reported herein is only one component of three major projects. The first two projects are concerned with:

1. The Roles and Responsibilities of the Secondary and Post-Secondary Institutions - the description and analysis of the perceptions of the public and of the institutions themselves concerning the roles and responsibilities of the secondary schools and the post-secondary institutions, with particular reference to the preparation of students for and their admission into post-secondary studies;

and 2. Nature of Students - the description and analysis of pertinent characteristics of students in the final two years of secondary and the first year of post-secondary education.

Project Three, although tentatively entitled "Nature of Programs" might better be called "Nature of Courses", since the primary focus has been placed on the relationship between courses offered in the senior years of secondary schools and courses offered in the first years of universities and colleges of applied arts and technology.*

The subjects that have been selected for intensive study are English, French, mathematics, physics, history, Anglais, Français, mathématiques, physique, and histoire.

GENERAL FOCUS OF THE STUDY

In its simplest terms this investigation is concerned with variability; variability in what is taught, how it is taught and evaluated, and the reasons for which it is taught. If variability is great in the teaching of a subject across a large number of schools then some accommodation to the resultant variability in student competencies must be made at the next institutional level. If a suitable accommodation is not made, failure rates can increase and/or students who have not had access to the appropriate educational opportunities are less likely to be successful. If post-secondary institutions do not attempt to respond to variability in the preparation of students, they become less efficient, in the sense that instructors cannot move ahead as rapidly as they could if all students had experienced a common educational program.

The research attempts to respond to the following questions:

1. Are there gaps in content covered and the level of difficulty at which content is taught in the teaching of a subject in a year

*Throughout this report the word "college" will be used hereafter to apply to the colleges of applied arts and technology.

level across the secondary schools that could lead to great variability in the preparation of students?

2. Are there duplications in content covered and the level of difficulty at which content is taught in the teaching of a subject across two institutional levels that lead to poor time economies?
3. If significant gaps and/or duplications do exist how are they explained and what effects do they have on the educational process?
4. If there are gaps and/or duplications in subject content what form do they take and how significant are they?
5. What social, economic and political factors contribute to educational discontinuities?
6. What trends have taken place over the past ten years with regard to course and program enrolments and student achievement and what factors explain these trends?
7. What provisions are presently made for the coordination of curriculum and student evaluation in particular subjects within and across the educational institutions under investigation?

The two concepts of flexibility and efficiency lie behind the concerns. An extremely efficient educational system with few options and with each course dependent almost entirely on preparation obtained in the one before it runs counter to a flexible system offering not only a great variety of courses but substantial content differences within each course. We have tried to describe the present state of the balance between these two conflicting concepts and suggest what might be the optimum balance in terms of the educational needs of the Province of Ontario at this time.

THE PERSPECTIVE

We have chosen to do the analyses in two separate independent interfaces.* The first of these concerns courses offered in year 3 or 4 secondary school and year one or semester one of the colleges. The second analysis investigates the relationship between courses offered in year 5 and

*"interface n: a surface forming a common boundary of two bodies, spaces or phases." Webster's Dictionary. The term is used in this study to denote the interrelationships and common characteristics of courses at two institutional levels.

courses offered in first year university. The assumption is, of course, that there should be a direct relationship between courses offered at one level and courses and programs offered at another. This relationship suggests students be provided at one level with the appropriate skills, knowledge and attitudes to enable them to perform adequately at the next level. We have avoided comparing the present with the past although data are presented which make such comparisons possible. It is far more useful to consider what is happening in education today in terms of current educational, economic, political and social issues. This is the perspective employed in this report.

We have also tried to keep in mind the fact that educational systems have many responsibilities only one of which is to prepare students for the next level of education. Slightly less than one-quarter of the students originally enrolled in year 1 secondary school attend Ontario colleges and another quarter go on to Ontario universities. This leaves over one-half of secondary school leaving students either being prepared for other educational alternatives or the work world. It follows logically then that many secondary school activities do not require post-secondary education for satisfactory closure, and, in fact, must not be designed on that assumption.

It also follows that an institution that accepts students who have taken essentially the same secondary school programs into both General Arts and Science programs to "broaden their educational horizons" and vocationally specific programs such as Engineering or Physical Education must anticipate some accommodations to incoming students.

A Chronology of Events Leading to Current Concerns

In our study of those events, concerns and decisions which, we believe, have developed into our present educational situation, we have focussed primarily on educational decision-making from 1945 to 1975. We indicate the conditions that appear to have led to the decisions and consider their implications.

EXPANSION

The Secondary Schools

The Reorganized Program. In 1962, the Reorganized Program was introduced into the secondary schools of Ontario. The time was opportune for a number of reasons. Enrolments at the secondary school level had risen from 123,846 in 1946 to 331,578 by 1962. Part of the increase was caused by the post-war baby boom and increased immigration. Post-war society had also changed and so had attitudes toward education. Stimulated by the war effort, Canada and Ontario in particular had moved into a technological society bringing urbanization, industrialization and rapid change in its wake. When a lag appeared in Canada's GNP (compared to that of the United States) a report by the Economic Council of Canada (1957) explained it in terms of a shortfall in the educational level of its work force. The report concluded that the labour force lacked skills adequate to the highly complicated technologies of an urban society. Society and government began to look upon extended schooling as a "prudent investment". Education would cure economic ills; it would equalize opportunities socially. It would be the panacea which would cure all personal and societal ailments. Thus both the citizenry and government were willing to invest in Ontario's future; federal, provincial and local governments contributed funds for the development of the educational system.

To understand better the changes made by the Reorganized Program (1962), a brief glance at secondary education before 1962 is helpful. Most secondary schools before 1955 offered an academic program directed toward grade 13 external examinations and university entrance. Course outlines and lists of recommended texts were provided by the Ontario Department of Education. Options were few: prerequisites and corequisites

further restricted choice. Alternatives to the general academic program consisted primarily of commercial or technical courses. There was little accommodation made for students failing grade 8. In 1947, out of 100 students in grade 9, eleven graduated from grade 13. Promotion at the secondary level was by grade, and a technical student could proceed to grade 13 only by repeating grade 12 at the academic level. By 1961, more schools had become composite, that is, they offered academic and vocational courses. Enrolment in vocational courses was comparatively low and yet the overall increase in enrolment at the secondary level meant that the academic program was not appropriate for all students. And as mentioned above, society's needs had changed.

In 1960, the federal government passed the Dominion-Provincial Technical and Vocational Training Assistance Act. The federal government agreed to provide a major share of the funds for six years for the construction of facilities and the development of vocational programs. New schools were built and vocational wings were added to others by school boards using the newly available federal monies. The Reorganized Program, or Robarts Plan, was introduced.

The Reorganized Program required schools to offer a wider range of programs at varying levels of difficulty. Secondary school programs were formed into three branches: Arts and Science, Business and Commerce, and Science, Technology and Trades. Each branch offered four and five-year programs. In addition, some schools offered two-year programs in one or two branches. An occupations program was created for those students who transferred rather than graduated from grade 8. Although the Reorganized Program offered more choice to students initially, once the student had chosen his path in grade 9, he was often restricted to that path. Transfer upwards in difficulty level was still not possible without repeating a year. Students failing grade 9 were often encouraged to try a lower level of difficulty and, in practice, passes granted on this condition were common. The four-year courses were very often perceived to be "watered-down" five-year courses. Enrolment figures for each branch and level from 1963 to 1968 inclusive show that the majority of students remain in the academic five year, Arts and Science stream (see Table 1.1).

TABLE 1.1

ENROLMENTS BY YEAR, IN SECONDARY SCHOOL

	5-year	4-year	2-year
1963			
A&S [a]	218,271	7,911	355
B&C	13,012	49,569	2,575
STT	12,741	36,715	2,466
1964			
A&S	221,177	13,094	216
B&C	15,031	58,166	2,534
STT	15,793	42,745	2,085
1965			
A&S	218,711	18,371	160
B&C	18,324	65,555	2,577
STT	19,087	47,978	2,217
1966			
A&S	216,605	19,918	
B&C	21,046	70,313	2,746
STT	22,238	52,744	2,277
1967			
A&S	223,162	21,591	
B&C	22,004	76,902	2,572
STT	25,586	58,802	2,911
1968			
A&S	199,252	25,120	
B&C	25,178	80,125	2,202
STT	29,821	64,469	3,255

Source: Fleming, 1971, vol. 1. p. 115. (Full details of all sources cited in abbreviated form in the text appear in the Bibliography.)

[a]A&S: Arts and Science branch
B&C: Business and Commerce branch
STT: Science, Technology and Trades branch

The Issue of French-speaking Students. French-language elementary schools had long existed as part of the Ontario education system. They served the needs of the French-speaking minority located primarily in two areas: northern Ontario and the Ottawa Valley. Some small steps were taken to accommodate the French secondary school age population before 1967. In 1962, for instance, secondary schools were permitted to include French as a language of instruction in history and geography; before this, only Latin and French could be taught in French.

The process accelerated in the late 1960s. The Royal Commission on Bilingualism and Biculturalism influenced the Ontario education system to take steps to accommodate the needs of the French-speaking student, who remained, however, a very small minority of the population (in 1974, there were just over 30,000 French-speaking students in Ontario secondary schools). The report of the Royal Commission, published in 1967, urged that it be made easier "for parents to have their children educated in the official language of their choice and that the government aid students in learning the other official language as a second language."

In 1968, Ontario permitted the establishment of French-language secondary schools. In areas where the Francophone population was not large enough, a secondary school could offer courses in both the French and English languages. After 1970 the federal government provided financial assistance for French-language instruction in both English- and French-language schools. In some areas of the province, experimental French immersion programs that provided instruction in many subjects in French for English-speaking students, were introduced.

At the post-secondary level, Ottawa and Laurentian Universities were requested by the federal government to give priority to increasing the number of degree programs offered in French.

French-language instruction in Ontario colleges began with the opening of the colleges in 1968, when Algonquin College offered one program in the French language. Since that time the number of programs offered in French has increased to 48 so that now approximately 25 percent of student enrolment at Algonquin is involved in French-language courses.

The success of the programs at Algonquin College contributed to the expansion of French-language instruction to three additional colleges. Federal grants were provided to the provinces to assist post-secondary institutions to offset additional costs resulting from offering education in the minority language. In addition, Francophone students could receive federal grants to study outside the province when courses were not available in Ontario.

Although provision has been made for teaching students in both the official languages, disparities exist. French-speaking students must take English from grade 5; French is an optional subject for English-speaking students. Because Ontario is primarily English-speaking, students learning French as a second language do not have the same opportunity to use French conversationally or socially as do Francophone students in a predominantly Anglophone setting. Textbooks in French at the secondary level are limited. Programs and courses in the French language are restricted in number at post-secondary institutions. Enrolment in programs taught in the French language is quite small and a number of colleges have listed courses as available in the French language if "sufficient" enrolment materializes.

The future growth of French-language instruction in Ontario colleges is unclear. The colleges and the government remain committed to serving all communities within the college system. However, the economics of offering French-language instruction to very small classes has been questioned. If French-language instruction is to grow employers must demand graduates capable of functioning in French.

Credit System. The need to design an educational system which would better suit the needs, abilities and interests of an increasing number of secondary school students who were remaining in school for a longer period of time still existed in the late sixties. The provincial government encouraged greater freedom to diversify courses and programs and to attempt organizational alternatives. Because of increased enrolments and perhaps somewhat of a desire for greater educational freedom, external grade 13 examinations were terminated in 1967. From 1965 to 1967, an increasing proportion of the teachers' confidential mark had been used

in conjunction with the examination mark to determine the student's final grade 13 mark. By June, 1967, 50 percent of a student's final mark in grade 13 was derived from the teachers' confidential mark, and 50 percent was derived from the student's examination mark. However, there were so many grade 13 candidates writing the external provincial examinations that the task of evaluating these examinations became prohibitive both administratively and economically. Thus by 1968, only the teacher's mark was used to assess students' work in grade 13 and to determine successful candidates for the Secondary School Honours Graduation Diploma. Each teacher was free to define his grade 13 course of study (within guidelines recommended by the Department of Education). Each teacher established his own standards, subject to school board policy, for successful completion of a course.

The presentation of the Hall-Dennis Report, Living and Learning, in 1968 gave further impetus to the idea of attempting to provide courses to suit diverse needs, interests and abilities. The report encouraged educators to develop the potential of each student, and to provide for the continuous growth of each child's unique abilities. During the latter half of the sixties, six secondary schools had been granted permission to experiment with alternatives to the Reorganized Program. In their experimenting, these schools attempted to develop greater flexibility in the system so that each student would have the opportunity to take a program that would, he judged, suit him best. These schools were aided in their attempts by the new computer-based technology, which permitted individualized timetables.

In 1969/70, the Department of Education, in its directive H.S.1, recommended that the credit system be implemented in all secondary schools. By 1972/3, this recommendation became mandatory. According to Circular (1970/1) H.S.1, students (with parental consent) were to be allowed considerable latitude in choosing their courses, provided they were drawn from each of four areas of study: (1) communications; (2) social and environmental studies; (3) pure and applied sciences; (4) arts. All courses in a school were to be designated to at least one area of study. However, the designation of the courses was left up to each school. Thus, a school could be more or less restrictive

by design; for instance, it could limit the communications area to English, or, on the other hand, enlarge the area of communications to include typing, music, etc. A student could transfer up or down in difficulty levels or across to new areas of study. All options were open, and prerequisites were to be kept to a minimum. Grade promotion, as under the Reorganized Program, was replaced by subject promotions and a credit was awarded for "successful completion of a course containing work that normally would be completed in 110/120 hours of scheduled time". (Circular H.S.1, p. 11). A minimum of twenty-seven credits was required in order to receive the Secondary School Graduation Diploma (SSGD). Six more honours level credits were required for the Secondary School Honours Graduation Diploma (SSHGD).

The increased freedom and flexibility at the secondary school level led to great variability in the educational system in a number of different areas. Course outlines emanating from the Ministry of Education were much more general in approach: they suggested and recommended, they did not issue directives. Standards of achievement required varied with the course and the teacher giving it. Once the student had the opportunity to take any course he wished, the attractiveness of the course to the student became important. Secondary school calendar descriptions from 1971/2 reflect this change in emphasis. Calendars also reveal an increase in the number of courses offered by departments in the secondary schools. Research (Leithwood, Clipsham, Davies, 1974) completed in 1973 reported that 57 percent of principals surveyed indicated that more courses were being offered in their schools than before the credit system came into effect; none had fewer.

Other changes in emphasis run parallel to the introduction of the credit system. The 1950s had emphasized academic training; the 1960s vocational training; in the 70s, emphasis appeared to be on developing the individual as a whole. Circular H.S.1 referred to development of skills of inquiry, analysis, synthesis and evaluation.

It would be logical to assume, then, that different aspects of student development might take on greater importance. Hence, there is a fairly general concern over student attitudes, student motivation, student ability to think, to approach a problem and perceive ways of coping with it. The acquisition of basic language and computational skills and specific knowledge has been given less importance. Recall of facts is not considered to be as important as one's knowledge of where to find the facts and one's ability to use them.

Decentralization. A series of steps taken by the Department of Education in the 1960s assigned many of the responsibilities previously carried out by the Department to local regions, boards, schools, and teachers. The removal of the external grade 13 examinations in 1967 allowed grade 13 courses to become more diversified. In the 70s curriculum requirements became curriculum guidelines, and much of the responsibility for interpreting and fleshing out the guideline was left to the individual board, school, department and teacher. Inherent in the credit system was the concept of curriculum development and revision. Courses were altered in content and difficulty level to attract students. New courses were created (e.g., consumer education, environmental science).

A further step toward decentralization took place in 1967. Department of Education inspectors became program consultants; instead of performing a supervisory role, program consultants were expected to act in an advisory capacity only, and had to be invited to enter a school. At the same time, boards of education were expected to supplement departmental consultants with their own subject experts and general superintendents.

By 1969, the process begun in the 1960s, of amalgamating over 2,000 school boards had been completed: a smaller number of greatly enlarged county boards of education were now responsible for elementary and secondary education in the province. It was hoped that the enlarged jurisdiction of the boards would tend to equalize opportunities and facilities over each area.

Post-Secondary Education

Universities. Until 1950, there were relatively few universities in Ontario. (Fleming, 1971, vol 1, p. 179, lists 5 universities with total full-time undergraduate enrolment of 20,621 in 1950). The university directly affected only a small segment of the population and cost relatively little public money. The post-secondary situation did not catch the public eye until the post-war years saw increased enrolments and interest in higher education.

In 1945, the Veteran's Rehabilitation Act was implemented by the federal government. It provided incentives for veterans to continue their studies at universities or in trade, technical, vocational institutes; the federal government paid the veteran's tuition and gave him a monthly living allowance. In addition, supplementary payments were made to institutions directly. In the first year over 20,000 veterans in Canada took advantage of the offer and universities were faced with expanding their staff and resources by at least half. They were prepared to do so, particularly with the financial assistance given to them by governments. By 1951, however, this federal assistance for veterans was withdrawn, and universities were experiencing difficulty in coping with enrolments that continued to expand. The Massey Report (see bibliography) of 1951 argued that universities were a national resource which should, therefore, be maintained and developed as such. In 1951, the federal government decided to grant each university an annual amount based upon the population of the province. Thus expansion of the university became feasible financially. The Sheffield Report of 1956 (see bibliography) which predicted that university enrolments would double in ten years gave further impetus to the idea that expansion was indeed necessary.

The prevailing attitude toward higher education in the 50s held that further education was important for both society and the individual. The launching of Sputnik by the Soviet Union, and the subsequent consternation in the United States, coincided with the report of the Gordon Commission (Economic Council of Canada Report) which in

1957 investigated Canada's economic prospects and concluded that Canada needed to expand its support for research and the development of scientists and skilled workers, in order to adapt rapidly to the demands of a technological society.

As a result of these pressures, opportunities for university education in Ontario were increased. Several new universities were established in the 50s and in the 60s, six new universities were chartered in Ontario - Brock, Guelph, Lakehead, Laurentian, Trent and Windsor - to help accommodate the influx of students interested in a university education. The location of some of the new universities was designed to improve access to university education throughout the province.

To enable expansion of the established universities and to create new universities, the government had to contribute funds in much larger proportions. By 1964, an indication of the provincial government's involvement in post-secondary education may be seen in the formation of a separate Department of University Affairs. The Minister of Education was responsible for this department until 1971, when the position of Minister of Colleges and Universities was created.

In the 1960s the United States poured money into science and mathematics education, research and research facilities. To the Ontario graduate, the lure from the south in the form of superior facilities and higher salaries proved to be very attractive and the "brain drain" to the United States for post-graduate work and/or employment aggravated the already inadequate supply of trained professionals to fill vacancies at universities. During this period, many foreign applicants were selected to fill positions at Ontario universities.

Colleges of Applied Arts and Technology. In the post-war years, provincial institutes of technology were established. These provided vocational training for returning veterans seeking a form of post-secondary education other than university. With the advance of technology, the number of institutes increased, but they were located regionally and tended to specialize. Attendance at these institutes tended to be restricted to those students living in the area; in 1965, total full-time enrolment was only 2,536.

By 1966, an increasing number of students were seeking some form of post-secondary education. A report submitted by a grade 13 study committee appointed by the provincial government in 1964 recommended that colleges be established because they were "required by the nature of the developing economy and talents of young people".* Post-war society had become increasingly urbanized, as well as technological. In addition, the Reorganized Program was graduating its first group of students from grade 12. These students were ready and waiting for some form of further education, but university education was not appropriate to the needs or capacities of many secondary school graduates.

In 1966, the provincial government enacted legislation to create new colleges of applied arts and technology, and to expand existing institutes of trade and technology to become colleges for the region in which they were located. The Ryerson Institute of Technology remained as a unique specialized polytechnical institution and was given degree granting status in 1971.

Colleges were located geographically so as to provide maximum access to students. They were designed to be flexible and responsive to both individual and community needs. Many diverse courses and programs were offered and attempts were made to accommodate each student at whatever educational level he/she happened to be. Manpower and apprenticeship courses provided retraining and trades courses. Make-up or catch-up courses in various subject areas provided a path for the student lacking adequate preparation to enter the program of his choice. Courses and programs at the colleges encompassed many areas of study, including applied arts and social and health services in addition to the traditional business and technology areas. One of the tasks of the college was to respond to local needs and interests. Given the attitude developing among more and more people that education was to be a lifelong and continuous process, the colleges found their continuing education programs expanding and diversifying. By 1968, 21 community colleges were operating in various regions of the province.

*Report of the grade 13 Study Committee 1964, F.A. Hamilton, chairman, Toronto, Ontario Department of Education 26 June, 1964.

BUDGETARY CONCERNS

Secondary Education

A report by the Economic Council of Canada in 1969 (see bibliography) termed education "Canada's biggest industry". By 1969, one-half of the population of Canada was under twenty-five years, and three-quarters of that population between five and twenty-four years of age were full-time students.

Although philosophical changes did much to influence the educational system, economic changes also played a major role. At the secondary level, as already noted, the contributions made by the federal government through the Technical and Vocational Training Assistance Act from 1961-66 enabled diversification of secondary school programs and courses. The willingness of the taxpayer and the government to invest in education in the 60s can be evidenced by the leap in government expenditures during this period (see Table 1.2).

TABLE 1.2

SECONDARY SCHOOL: REVENUES OF ONTARIO SCHOOL BOARDS FOR ELEMENTARY AND SECONDARY EDUCATION

Year	Provincial		Local		Other[a]	
	(in 000's)	% of total revenue	(in 000's)	% of total revenue	(in 000's)	% of total revenue
1945/6	26,607	42.9	34,345	55.3	1,116	1.8
1950/1	46,742	39.7	68,282	58.0	2,716	2.3
1955/6	82,898	37.5	127,001	57.5	10,908	4.9
1960/1	160,791	37.6	253,900	59.5	12,294	2.9
1965/6	332,034	44.2	395,985	52.8	22,455	3.0
1968	571,099	45.9	632,971	50.9	39,807	3.2
1970/1 - not available in source						

Source: Fleming, W. G., 1971, vol. 1, p. 328 The Expansion of the Educational System, Ontario's Educative Society.

[a]E.g., sale of school building sites and equipment payments by the federal government; and fees paid by individuals.

The ability of local areas to raise taxes required to finance elementary and secondary education varied greatly. This variability became more pronounced as the amount needed for education increased each year. Thus in 1964, the provincial government enacted the Ontario Tax Foundation Plan in order to accelerate the process of equalizing educational opportunities from one area to another. A provincial grant was made to each school board up to a certain foundation level so that those local boards unable to raise enough revenue locally would be assured of a certain minimum of funds. In 1969, this Tax Plan was revised.

By 1969, the provincial government was supplying almost half of the boards' revenue. At the same time, inflation increased the money necessary to provide that half. The public was becoming somewhat disenchanted with the ever-increasing expense of education. Even though more students were remaining in school longer (see Table 1.3) the post-war baby boom had passed through secondary schools by the late 1960s and by 1974/5 the growth rate had actually taken a slight dip.

TABLE 1.3

SECONDARY SCHOOL ENROLMENT AS A PERCENTAGE OF POPULATION 15-19 YEARS OF AGE

1950/1	41%
1955/6	51%
1960/1	62.6%
1965/6	73.3%
1968/9	77.1%

Source: Fleming, 1971, vol. 1, p. 98

Costs continued to escalate. In 1969, the provincial government placed ceilings upon educational spending in the province. Although inflation continued to affect costs, the ceilings slowed down the increased expenditure.

In 1970/1 costs increased by 13.1 percent, in 1971/2 by 8.9 percent and in 1972/3 by 7.4 percent.

Unfortunately the budgetary restrictions coincided with the introduction of the credit system. Many sectors of the educational community strongly opposed the ceilings. They maintained that the nature of the credit system demanded an increase in the diversity of courses offered; that the student required increased help and guidance in selecting appropriate courses; that teachers required additional time for professional and curriculum development. All these supports cost money. Yet the enrolment at the secondary level tended to show a levelling off. The government maintained its stance with regard to expenditures until December 1975.

University Education

Operating Grants. Prior to 1966, the universities were granted money from two sources. The first was the federal government, which allocated funds on the basis of the population of each province. These funds were then distributed among the institutions based on their proportion of the total full-time post-secondary enrolment.

The second source, the provincial government, granted funds on the basis of requests submitted by each institution. These grants took into account the funds received from the federal government.

In 1967/8, the method of distribution was changed; the federal government turned over its funding responsibility to the provincial governments when the Federal/Provincial Fiscal Arrangements Act was introduced. As a result of this agreement, Ontario became responsible for the distribution of all general operating funds to the universities.

By 1966, the allocation of federal and provincial funds to provincially assisted universities had grown considerably and it was thought advisable to change to a more equitable method of distribution. Formula financing was introduced and implemented for the first time in 1967/8. By this process, grants were distributed to universities on the basis of the number of full and part-time students registered at the university.

In order to determine the amount to be granted to each university, a basic income unit (B.I.U.) was established. The B.I.U. was approximately equal to the annual cost of one student in a general arts program. As costs fluctuated, the B.I.U. was adjusted. In addition, student costs varied from one program to another. Eight categories of student were generated on the basis of the nature of the program and the level of study. Funds were distributed to each university according to the number of basic income units its enrolment warranted. A supplementary formula grant was made to newer universities to offset increased expenses. Formula financing, although it tended to have "steering effects" (i.e., encouraged the development of some high-revenue programs) did not seriously affect universities while enrolments were still growing rapidly (e.g., Table 1.4, 1967/8, 1969/70). By 1972/3 however, average growth rate had dropped and some of the newer universities began to experience financial problems. The slowdown in enrolment growth had not been predicted, and many universities found that their predicted figures and therefore their funding estimates were not accurate.

TABLE 1.4

ENROLMENTS AT POST-SECONDARY INSTITUTIONS 1965-75

	Post-Secondary Non-University		University
Year	No. enrolled	% Change	No. enrolled
1965/6	21,506	6.4	59,274
1966/7	25,298	17.6	68,930
1967/8	34,014	34.5	79,433
1969/70	49,775	9.7	108,825
1971/2	58,308	6.0	134,419
1972/3	54,040	7.3	135,195
1973/4	55,399	2.5	141,553
1974/5	58,400	5.4	not available

Source: Ontario Economic Council, Issues and Alternatives 1976; Statistics Canada, Education Canada: A Statistical Review, 1975.

TABLE 1.5

PROVINCIAL AND FEDERAL GRANTS TO PROVINCIALLY ASSISTED UNIVERSITIES (in 000's) FOR SELECTED YEARS

Operating Grant		Provincial Capital Grants	
1957/8	$ 14,248	1957/8	$ 9,500
1958/9	18,578	1960/1	12,700
1959/60	20,170	1965/6	89,239
1960/1	23,623	1968/9	131,974
1961/2	26,673		
1962/3	32,789		
1963/4	41,623		
1964/5	53,331		
1965/6	72,984		
1966/7	112,269		

Source: Fleming, 1971, vol. 1. p. 355 (Table 7.41).

In 1973/4, therefore, slip-year financing was introduced for universities. Grants were based on student enrolment of the previous year. In this way, the university would have some time to adjust to any sudden fluctuation in enrolments. In 1976/7, for the first time, an enrolment averaging technique was used to further smooth out abrupt changes in enrolment.

The colleges were financed on the basis of budget line-by-line review until 1970/1 when formula financing was introduced. The formula was also based upon the Basic Income Unit. At the colleges, the B.I.U. was based upon student contact hours, and the number of contact hours for each student in a given fiscal year per B.I.U. was estimated at 852. As in the universities, certain weightings were applied according to the nature of the program.

For certain colleges, the K factor was introduced. This factor took account of the college's size and geographical position, and was used to increase the B.I.U. component for a specific college relative to others. Thus small colleges were able to provide comparative services that would usually be discouraged due to their size.

In 1973/4, when nursing students were transferred to the colleges, this portion of the grant was funded on a budget review, line-by-line basis. This was discarded in 1975/6, when nursing was integrated into the grant-funding system. In 1974/5 slip-year financing was introduced. This funding scheme provided grants based on 1973/4 revenue full-time equivalents (F.T.E.'s) plus an enrolment growth grant for growth since 1973/4. The growth grant varied from college to college.

Colleges, however, went off the formula in 1975/6 in favour of a basic percentage increase plus small growth allowance. Since then a distinct method of awarding grants has been developed. This is primarily breaking college expenditures into two sections--a plant and property grant and an activity grant. The plant and property grant is to meet the costs of maintaining the physical plant and is based upon audited financial statements modified to reflect the particular circumstances of each college. The activity grant takes account of the educational component using direct teaching salaries as one criterion and all other costs as the second in grant distribution.

There has been criticism, recently, of the government financing of post-secondary institutions and the revenues generated from tuition fees. The Economic Council of Ontario (Issues and Alternatives 1976) strongly recommended that students' fees at post-secondary institutions be increased, pointing out that post-secondary education offers certain private benefits to individuals as well as societal benefits. The Council of Ontario Universities also supported an increase in tuition fees, although each recommendation was careful to require that student aid be raised to help the disadvantaged when fees were increased. University fees accounted for nearly 20 percent of operating revenues ten years ago but by 1976/7 this figure had fallen to slightly over 14 percent. In the colleges fees which had once accounted for nearly 13 percent of operating income account for about 10 percent of operating revenues.

Student Loans and Scholarships. The principle of equality of opportunity led to the direction of government funds at the post-secondary level into improved student loan and scholarship programs. In 1964, the federal government introduced the Canada Student Loan Plan, which was operated by the provinces. Loans were made on the basis of a certificate of eligibility issued by the province. The federal government carried interest charges while the student was involved in full-time studies and for six months thereafter. By 1970, approximately 40 percent of post-secondary students were participating in the plan. In 1966/7, a new Province of Ontario Student Awards Program was introduced. A candidate for the program accepted into a post-secondary program was eligible on the basis of need. The first $150.00 were given in the form of a loan, the remainder of the assessed need as 60 percent loan, 40 percent grant.

THE CURRENT CLIMATE OF CRITICISM

Public education comes under criticism at almost predictable intervals. The delicate balance between education directed toward the needs of society and the individual creates a fragile framework, vulnerable to many kinds of criticism. Educational decisions are often made for political purposes in response to a particularly vocal minority with very little evidence to support their accusations. A 1974 decision by the Minister of Education to make more secondary school courses mandatory is representative of a political response to perceived pressure for change. Not only did this decision have virtually no effect on student course selection, it also contravened recommendations from senior educational officers based on a series of public forums held throughout the province. The interface study represents a major breakthrough in government policy. Accurate data will be made available to a large segment of the community concerned with education. Reactions will be sought before a new policy is implemented. Perhaps we are turning a corner toward a more rational process of system-wide, integrated educational decision-making. The following sections identify some of the concerns which must be considered in this program.

Secondary Education

As a result of decentralization, certain concerns have emerged. Course offerings have proliferated. These courses require teachers, time, new materials, texts, and consultant support to be effectively developed. Standards of entry into courses are beginning to vary substantially since prerequisites have been deemphasized. On one hand there is concern that students are selecting easier courses and teachers are lowering their standards and inflating marks in order to attract students. But on the other there is evidence that non-university-bound students are having difficulties with the credit system (King, 1973).

The criticisms come from many different sources but they tend to fall into three main areas: language skills, basic mathematical skills and knowledge of Canada. In 1974, the Ministry of Education responded by stipulating that students must have four credits in English and two in Canadian Studies in order to obtain an SSGD,* and recently added two credits of mathematics and one of science. The Ontario Secondary School Teachers' Federation report, At What Cost (1976), strongly recommends a return to a mandatory core curriculum in order to ensure minimum standards. This report suggests a reexamination of diploma requirements and achievement standards so that the diploma awarded may be a clear indication of certain specific achievements. The Economic Council of Ontario's report comments that "in the interests of society, a certain minimum level of education is required" and "in the case of...early secondary education, the student has generally not achieved sufficient maturity to choose wisely."

Post-Secondary Education

Admission Requirements. Until the 1960s, admission requirements at university were a relatively straight-forward affair, based upon the student's average determined by his final mark on eight or nine different papers, externally set and marked at grade 13 level. External examinations given by the provincial Department of Education established standards, and all entrants could be judged in terms of these standards. By 1965, however,

*See H.S.1 1974/5, p.7 for a detailed breakdown of the courses that can be classified as English and Canadian Studies.

part of the student's final grade 13 mark in a course was derived from the teacher's confidential mark. These confidential marks rapidly assumed a larger proportion of the final mark; yet because the confidential marks were adjusted, final marks were still comparable from one teacher to the next. When the external examinations were discontinued in 1968, final examinations and marks became the responsibility of each teacher. Marks were no longer adjusted, and were no longer comparable from one school to another nor from one teacher to another. It seems more than mere coincidence that in 1968 failure rates in grade 13 courses were halved (see Trends, Figure 28) and the number of Ontario scholarship winners grew from 13,285 in 1963 to 28,871 in 1968.

Universities were in a predicament. The former admission requirement of a 60 percent average on eight or nine papers was no longer easy to assess for two reasons. First, 60 percent did not mean the same thing from one school or teacher to another. Second, the number of papers students were writing in grade 13 had changed. In 1965, language and literature papers were combined into one three-hour paper for courses in English, Français and Modern Languages. In 1966, a single biology paper was introduced. In 1967, Math A and B papers replaced algebra, trigonometry and analytic geometry. Thus the former eight or nine papers became four or five papers. When the credit system was introduced, a further complication was added. Although a student was required to take six year 5 credits to receive a Secondary School Honours Graduation Diploma (SSHGD), twenty-seven credits acquired at any difficulty level could be taken to receive an SSGD (year 4 diploma). It thus became a rather complex task to uncover a student's secondary school background. Standardized aptitude tests and college entrance examinations such as those administered by SACU (The Service for Admission to College and University) similar to tests used in the United States, formed part of the entrance procedures at some universities after 1968. However, when enrolment growth decreased, and because operating grants are based upon enrolments, the additional cost of supporting a standardized test program that did not contribute substantially to the selection procedures was questioned.

Concern has been expressed about the quality of students entering post-secondary educational institutions. The Toronto Globe and Mail (May 1975) quoted a Brock University announcement that the university is planning an English test for incoming students. A meeting of chairmen of English studies areas in the colleges in July, 1976, considered the possibility of a standardized testing program for beginning college students. A study conducted by Professors Kerpneck and Priestley from the University of Toronto, sponsored by ACUTE (Association for Canadian University Teachers of English) investigated the state of undergraduate English programs across Canada. Included in their investigation were questions related to the quality of preparation of incoming students, and to remedial opportunities at the university level. In September, 1976, a report of the "literacy" level of Queen's University freshmen was presented by Colin Norman of the English Department at Queen's University. A report by the Canadian Chamber of Commerce, Basic Educational Skills (June 19, 1975), investigated English and mathematical skills of students at 50 universities and 70 colleges, and concluded that high school students were deficient in these areas.

The current emphasis upon individualization at elementary and secondary levels is reflected at the post-secondary level. Freedom of course selection at the secondary level led to students with varying backgrounds entering post-secondary courses. At the universities, the variable quality of first year students appears to have contributed to an increase in course offerings at the first year level. This diversification, both in content and difficulty level, seems to be a logical extension of the pattern begun at the secondary level. In addition, financial considerations may have influenced university attempts to diversify in order to attract students. At colleges, there is even greater variety in program offerings and mechanisms for accommodating incoming students. This is a natural outgrowth of the expectation that colleges will accept all applicants and adapt courses to suit individual needs.

Summary

There are three main factors that appear to have contributed to the current concern with Ontario education:

1. decentralization of educational decision-making
2. declining enrolments
3. increased emphasis on individual student differences

Also the introduction of French secondary schools and post-secondary opportunities for learning in that language has added to the complexity of decision making in education. The decentralization process in the secondary schools, in combination with a renewed ideological orientation to attend to individual student differences led in part to the removal of the Department of Education grade 13 examination policy. Schools were encouraged to develop their own curricula and organizational procedures in terms of "local need". Ministry documents softened their terminology, courses of study were modified to become general guidelines. The emphasis on the development of the individual has led to extreme variability in courses, in content, in standards. The attempts to equalize opportunities for all students have led to a diversified and perhaps inefficient system of education at the secondary and post-secondary level. Declining enrolments - or the fear of declining enrolments - seem also to have led to competition among instructors and among institutions for students and have precipitated financial concerns that have also been exacerbated by unclear educational priorities. Financial issues have inevitably emerged as the proportion of educational costs to total government budget has risen and university and college graduates have not been as successful in obtaining employment as graduates had been in the past.

This report is designed to provide accurate information on which to base rational, systematic decision-making on these issues.

2 Methodology

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METHODOLOGY

Our primary task was to develop procedures that would allow us to collect detailed information on what was being taught in a number of courses across Ontario's educational institutions. We were asked to study the following subjects: English, French, history, mathematics, Français, Anglais, mathématiques, histoire and a representative science. After consultation with senior educational officials it was decided to select physics (and physique) as the representative science. These subjects were to be studied in terms of the relationship between them across two institutional levels. An example of one of the questions for which answers were sought is: Are students graduating from English courses in year 5 suitably prepared for entry into year 1 university courses from the point of view of university instructors?

This discussion of the methodology is divided into four main sections. In the first we define the interfaces in more specific terms and indicate how the samples of courses, secondary schools, colleges and universities were determined. In the second, procedures for the development of the questionnaires, interview schedules, and rating validation scales are presented and sources of other relevant data noted. The procedures employed in data analysis and presentation are summarized in section three along with our suggestions for interpreting the findings. And in the fourth section we provide a rationale for the manner in which the findings are presented and discussed in the remainder of the report.

The Interfaces

The definition of the term "interface" was further refined to fit the framework of this study. Two interfaces were established for all subjects except Anglais, French, history and histoire. Each analysis typically focussed on one subject offered at the secondary school level and the comparable subject offered at the post-secondary level. The following interface analyses were conducted:

1. English general and advanced year 4 secondary school, and English year 1 college;
2. English year 5 secondary school, and English year 1 university;
3. Mathematics and Mathématiques general and advanced year 4 secondary school, and Mathematics and Mathématiques in technology and business courses year 1 college;
4. Mathematics and Mathématiques year 5 secondary school, and Mathematics and Mathématiques year 1 university.
5. History and Histoire year 5 secondary school, and History and Histoire year 1 university;
6. French year 5 secondary school, and French year 1 university;
7. Physics and Physique general and advanced year 3 secondary school, and Physics and Physique year 1 college;
8. Physics and Physique year 5 secondary school, and Physics and Physique year 1 university;
9. Français general and advanced year 4 secondary school, and Français year 1 college;
10. Français year 5 secondary school, and Français year 1 university;
11. Anglais year 5 secondary school, and Anglais year 1 university.

Not all courses offered in years 4 and 5 of secondary schools and the first year of the colleges and universities could be studied, because of the massive amount of analysis this would entail. The following rationale was established by the Ministries of Education and of Colleges and Universities for the selection of the courses studied. English and Français represent the basic languages of instruction in the province and there is a great deal of concern developing among educators and the public regarding the quality of language instruction in the schools.

French and Anglais provide a perspective on second-language learning. Mathematics and mathématiques were defined as basic support subjects; they were included not only because of their importance as basic life adjustment skills but also because of their involvement in other disciplines. History was included as a representative discipline in the humanities and social sciences and because of the "Canadian Studies" controversy that has been recently aired. Physics was chosen to represent the sciences almost by default: there was some question about the viability of biology as an interface course (a member of our research team indicated that instructors of first year university biology tend to repeat much of what was normally taught in year 5 secondary school) and chemistry had recently been studied in this context by the Science Teachers Association of Ontario.

The Educational Institutions

The courses identified for study were chosen in two stages. First the institutions were selected and then a sample of courses was drawn from each institution. The samples of courses were therefore not drawn directly from the population of courses available to students in the province.

THE SECONDARY SCHOOLS

The teachers in the sample of secondary schools were not only required to fill out our questionnaires and rating validation instruments but also to respond to the research instruments of the Project II research team. The needs of the two research groups were not exactly the same and some compromises were necessary in the selection of the schools and the conditions under which the administration of the instruments would take place. It was decided to select 60 English secondary schools and 15 French secondary schools. The numbers were limited by budget and practical constraints. The decision was made with due regard for the fact that statistical precision would almost certainly be less for the French schools than the English schools. In the judgment of our statisticians the

choice of 60 and 15 constituted something of a balance between the demand for statistical precision, which would be satisfied only by oversampling French schools, and the need for adequate representation of English schools in the study.

The population of English secondary schools was stratified by geographic region and seven regional categories were established:

1. Metropolitan Toronto (excluding Mississauga)
2. Hamilton (because of its unusual year 5 schools)
3. Northern Ontario (defined as northwestern, mid-northern and north-eastern regions - using Ministry of Education geographic regions)
4. Urban West (defined as any city over 50,000 population in the Niagara, western and midwestern regions)
5. Urban East (defined as any city over 50,000 population in the Ottawa Valley, eastern and central regions, excluding Metro but including Mississauga)
6. Rural West (defined as the rest of the Niagara, western and midwestern regions)
7. Rural East (defined as the rest of the Ottawa Valley, eastern and central regions)

Within the population of French schools and within each of the seven geographic strata for English schools, a further stratification was made on the basis of size. Size was determined by combining the year 4 and year 5 student population. Schools were rank-ordered in their regional groups according to their determined size. The number of schools needed from each geographic area was determined by the proportion of the total Ontario year 4/5 student enrolment which each geographic area held.

The required number of schools was drawn from each geographic area in the following manner. If 4 schools were required to represent a particular area, the rank-ordered list of schools was divided into 4 and one school was randomly chosen from each of the 4 to ensure that the year 4/5 student population was proportionately represented.

All special vocational schools, private schools, and schools offering special programs for small numbers of students (e.g., SEED) were excluded from the study. But technical schools and schools of commerce were included in the population.

For purposes of this study French secondary schools were defined as those schools which graduated year 4 and year 5 students in the French-language courses under investigation. Thus, both French and bilingual schools were classified as French schools.

When the list of secondary schools was determined, regional Ministry of Education research service coordinators were asked to obtain clearance from the directors of boards of education so that the schools selected could be contacted. Of the 75 schools selected initially, 54 agreed to participate. The schools that declined did so for one of two reasons. Teachers in some schools had been or were on strike and the disruptions caused by the data collection could further curtail an already shortened school program. Other schools had been heavily surveyed in the past few years and it was felt that further research would be unreasonable for both students and teachers. When a school chose not to participate, we attempted to replace it with a school drawn from the same category noted above. As we moved closer to the date for the administration of our survey questionnaires, it became more difficult to replace schools. The biggest factor affecting the selection of an appropriate sample was a strike in the Metropolitan Toronto schools. The final sample was 53 English schools and 14 French schools.

COLLEGES

The number of colleges in Ontario is too small from which to select a truly representative sample. Instead we selected 15 colleges to be somewhat representative of the 22, on the basis of the following criteria:

1. Geographic location (north; east, west; central)
2. Size (large; medium large; medium-small; small)
3. Background (new since 1966; former institute of technology; former institute of trades; vocational centre)
4. At least two colleges offering some courses and/or programs in which the main language of instruction is French.

Four of the colleges were located in the northern part of the province; 3 were south-central; 3 were east; and 5 in the west. We used 3 size classifications: 6 of the colleges were designated large (over 3,500); 4 were medium (1,500-3,500); and 5 small (less than 1,500).

Ten of the colleges were established as new institutions in 1967 or 1968. Two were selected because they offered courses and programs in French and 5 were formerly vocational centres, technology, or trade institutes.

UNIVERSITIES

As was the case with the colleges, we found it necessary to select a representative group of universities for study. Eleven universities were chosen on the basis of French-language offerings, age, location, and size. Three of the universities were located west of Guelph; 3 were from the western part of Lake Ontario; 2 were in Northern Ontario. (only French offerings in one of these universities were included); and 3 were in eastern Ontario. We used 3 size classifications: 4 of the universities were designated large, 2 medium and 5 small. Two were selected because they offered courses and programs in French.

The Courses

THE SECONDARY SCHOOLS

Once the secondary schools, colleges and universities had been identified, the course offerings in the specified subject areas at these institutions in the appropriate year were considered to be the population of courses from which the samples would be drawn.

In the case of the secondary schools, one course from each subject area on the basis of year and level of difficulty at which the course was offered was sampled. Where more than one section of a course was offered a section was chosen randomly for study. When more than one equivalent course was offered in a subject at the same year and level (e.g., two year 5 thematic English courses) the course with the highest enrolment was selected. This situation occurred more often in English, history and French. This approach provided us with a pool or group of courses in a subject area which were comparable to each other and suitable for conducting straight-forward analyses. But as a result of this course selection procedure, specialized English literature courses, courses offering independent study in history, certain French literature courses and other more or less irregular courses were not studied in detail. However, these latter courses have been considered in the discussion.

Once the courses to be included in the sample were drawn, instructors teaching the specified courses were asked to fill out a questionnaire concerning the course. From the instructors' responses, a description of the course was developed. In certain schools, particularly some of the smaller schools, it was found that some instructors were teaching more than two of the courses selected, and would have had to fill out more than two questionnaires. Because the questionnaires were lengthy, it was decided not to ask any respondent to fill in more than two questionnaires. This restriction did delete a few course descriptions from certain schools, particularly from the French schools and in such subjects as mathematics and physics. When it became necessary to delete a course, it was done in such a way as to maintain a balance in the total number of courses studied in each category. A detailed breakdown of the courses sampled, and the relationships of the samples to the total population of courses appears in each subject section.

UNIVERSITIES AND COLLEGES

At the colleges and universities a process similar to that for secondary school course selection was followed. Because colleges and universities were few in number, compared to secondary schools, and normally more than one type of course in a subject made up the post-secondary side of the interface, a number of courses in each subject area were sampled. However, categories of courses were not as clearcut as at the secondary schools. Course descriptions from college and university calendars were used as a guide, but these descriptions were rather vague in some instances and it was necessary to contact the institutions for clarification. We asked each post-secondary institution to provide us with a list of the courses that fell into the categories we had established (in first year, a full year course, normally entered into after year 5 in the case of the universities and year 4 in the case of the colleges). The magnitude of the enrolment in these courses was an important factor in their inclusion or exclusion.

English

At the colleges we focussed on communication courses (in some cases including both oral and written) and excluded the very few literature courses offered. Typically courses chosen were offered in the first semester and in a few instances followed by specialized English courses (e.g., alienation, revolution, Canadian literature) in the second. These courses tended to be open to students enrolled in most programs. In summary, our pool of English college courses included primarily one-semester communication courses.

At the universities we found the most common English course to be a one-year survey course covering English literature from past to present. This, therefore, became our basic course, augmented by thematic courses (such as Canadian literature or "The Hero").

French

We selected university courses in French to fall into two main categories, French literature and language. Some French courses were clearly remedial in orientation and were not given university credit. Other language courses appeared to be remedial but were given course credit and a small group of them were selected for study.

History (histoire)

There was considerable variety in the range and type of history courses offered in the universities in our sample. Our decision was to select the standard European survey course as the basic unit of analysis since it was offered in most universities and to supplement it with other survey and thematic courses.

Physics (physique)

We found it quite difficult to identify common patterns of courses in physics and physique at the college level. Physics is taught as physics over one, two or three semesters, or as Mechanics, Electricity or Sound in one-semester courses. Our decision was to use one-semester courses as the basic time unit, technology and technician programs as the divisional

area of study, and to look at all courses that normally fall within the definition of physics. This created a realistic framework for analysis.

Although university physics and physique courses tended to be offered in many different formats they were typically offered as year-length courses. Again, as with mathematics, we restricted our selection to courses offered in Faculties of Arts and Science normally taken by students entering from year 5 secondary school. In addition we included a small number of physics courses designed for specialized programs (Engineering, Physical Education).

Mathematics (mathématiques)

At the colleges we selected our mathematics and mathématiques courses from those divisions where they were most commonly found in some standarized format, Business and Technology. The courses were typically one-semester and emphasized basic mathematics. We anticipated employing two separate pools of courses in our analysis, business and technical mathematics.

The university course offerings did not offer an easy matchup with the year 5 secondary school offerings. We chose to emphasize mathematics and mathématiques courses offered in Faculties of Arts and Science plus a sampling of courses from applied programs such as Engineering to keep the number of analyses within the time frame of the study. Calculus (calcul) and algebra (algèbre) formed the basic groupings of first year university courses, but some additional courses were included to illustrate the variability of course offerings at the university level. Where courses were offered in one semester we attempted to match them with their second part in the second semester and encouraged the instructors to consider both semesters as one course.

Anglais

We found Anglais to be taught as a formal, first year university course in only one of our sample institutions, and decided to consider it as a case study in this particular institution.

Français

Français courses are normally offered in one of two categories at university, language or literature. We attempted to select representative courses

from each of these two categories.

The college Français courses selected were comparable to the English and focussed on basic communication or language.

Collecting the Data

Table 2.1 summarizes the data collection procedures employed in this study. A more detailed discussion of the procedures follows.

QUESTIONNAIRES

Since there was reason to believe that there was considerable variation in the content of the courses to be studied, it was necessary to develop very flexible data collection procedures. We selected the questionnaire as the basic data collection device and instruments were devised, keeping the following objectives in mind:

1. The questionnaire should allow all respondents to describe their courses fully;
2. The response categories must allow for easy summarization and quantification;
3. The data must be compatible for analysis across institutional levels;
4. It should be possible to fill out the questionnaire within a reasonable amount of time.

We were least successful in attaining the fourth objective. It was decided that the instructor actually responsible for the course would provide the most useful information. This information was to be supplemented and validated through additional procedures (content analysis of calendars, course outlines and examinations).

Questionnaires were developed to enable each instructor to describe his course, including its content, the way in which it was presented, the factors perceived as influencing the nature of the course, the type of student evaluation used, the characteristics of incoming students, and other areas thought necessary for a complete course description.

Table 2.2 sets out the stages in the questionnaire design and administration.

TABLE 2.1

SUMMARY OF PRIMARY DATA
COLLECTION PROCEDURES

QUESTIONNAIRES

Sources of Data	Information Sought
1. Secondary school teachers of year 5 English, Anglais, Français, French, History, Histoire, Physics, Physique, Mathematics and Mathématiques; Year 4 teachers of English advanced, English general, Français advanced, Français general, Mathematics advanced, Mathematics general, Mathématiques advanced, Mathématiques general; Year 3 teachers of Physics advanced, Physics general, Physique advanced, Physique general	Course descriptions, characteristics of students, factors influencing teaching, background of instructors
2. College teachers of year 1 English, Français, Physics, Physique, Mathematics and Mathématiques	
3. University teachers of year 1 English, French, Français, History, Histoire, Physics, Physique, Mathematics, and Mathématiques	

INTERVIEW SCHEDULES

4. University Teachers of Year 1 Anglais	Course descriptions, characteristics of students, factors influencing teaching, background of instructors

TABLE 2.1 (Cont'd)

SUMMARY OF PRIMARY DATA
COLLECTION PROCEDURES

INTERVIEW SCHEDULES

Sources of Data	Information Sought
5. University department heads in English, Français, French, History, Physics and Mathematics 6. College subject supervisors in English, Français, Physics and Mathematics 7. Secondary school department heads in English, French History, Physics and Mathematics	Trend information on student achievement, changes in course offerings and content, student characteristics, departmental organization. Subject coordinating mechanisms
8. University registrars 9. College registrars	Trends in admission requirements, enrolments, student achievement, policy regarding program requirements

RATING VALIDATION INSTRUMENTS

Sources of Data	Information Sought
10. Secondary school teachers of year 5 French, year 4 and 5 English and year 4 and 5 Mathematics 11. College instructors of year 1 English and Mathematics 12. University instructors of year 1 English, French and Mathematics	Consistency of respondents' use of rating scales employed in questionnaires

TABLE 2.1 (Cont'd)

SUMMARY OF PRIMARY DATA
COLLECTION PROCEDURES

CONTENT ANALYSIS

Sources of Data	Information Sought
13. Secondary school calendars 14. College calendars 15. University calendars	Course descriptions and trends in content and offerings
OTHER	
16. Ministry of Ecucation records	Course enrolments and patterns of student achievement
17. Ministry of Colleges and Universities records	College program enrolment trends, advanced standing and advanced credit trends, university program enrolment trends

TABLE 2.2

STAGES OF QUESTIONNAIRE DESIGN

1.	Framework (Basic Outline)	January 8-February 12
2.	Discipline teams develop content section	February 13-14
3.	Refinement and revision	February 15-March 31
4.	Further consultation with discipline experts	February 15-March 31
5.	Informal pretest and further revision	March 22-March 29
6.	Pretest	March 29-April 7 April 25-May 3 for Français questionnaires
7.	Further revision	April 7-15
8.	Orientation of administrators and monitors	April 21 for college and university administrators May 15 for secondary school monitors
9.	Administration	Initiated April 26 at universities and May 1 at colleges; On or about May 26 at secondary schools

The questionnaire was developed in two parts. The first part involved the development of questions which would be common to all questionnaires. While these questions or items helped to elicit specific course descriptions, they also allowed for summarization of responses across all subject areas (for example: questions were developed which asked the respondent to rate the quality of preparation of incoming students, and to indicate how the final mark was determined).

The second part of the questionnaire was subject-specific. It was decided to invite subject specialists from each institutional level to form a discipline team and help the research team in the design of the subject-specific segment of each questionnaire. In order to make the most effective use of the discipline teams, our research team consulted research design experts and then developed a common outline for use by each discipline team. This outline also provided some standardization of format from one subject area to another.

The task required of discipline team members was described to a number of prominent educators and representatives of educational organizations from the secondary schools, colleges and universities. They were requested to submit names of those they thought had the capabilities and willingness to serve on a discipline team. A list of at least ten names was developed for each subject area at each institutional level. From each list two or three individuals representing each institutional level were selected. Each person was called, the study described, his anticipated role and details on meeting times provided. Response to the invitation was most gratifying: virtually every person first contacted agreed to participate. Ministry of Education and Ministry of Colleges and Universities discipline experts were also invited to attend. On the weekend of February 13 and 14, 1976, discipline teams convened at the Chelsea Inn in Toronto to draft the discipline-specific portion of the questionnaires. Each team was guided by a member of our research committee. It should be noted that some discontent was uncovered at these meetings. Two of the subject groups were concerned with the hurriedness required to implement the study as well as its political overtones. However, after some clarification of purpose and direction both groups agreed to continue although some members had to be replaced.

The discipline team meetings produced a first draft of the discipline-specific portion of the questionnaire. It was then the task of our research committee member associated with each subject group to work in cooperation with the other core committee members to revise and refine the information suitably. Our research committee members were in continuous contact with discipline team members for review. By mid-March, questionnaires were ready for informal tryouts. By the end of March questionnaires were ready for pretesting in 1 university, 2 colleges and 6 secondary schools. Because all French-language questionnaires required very careful translating, their pretesting was delayed by two to three weeks. Further revisions were made and all questionnaires were ready to be administered at the universities by April 26.

In order to gain the support of each institution involved in the study and to maximize the returns, it was decided to designate one person from each university and college to be responsible for administration of and return of the questionnaires. A meeting was held to acquaint the college

and university liaison officers with the task. A similar procedure was used in the secondary schools. Monitors in each secondary school assumed responsibility for guiding the respondents through the questionnaires and making sure all questionnaires were filled in and returned. The time frame set out for the study created some awkward situations for the schools; for example, it was necessary to request that questionnaires be filled out at a time when teachers were attempting to complete courses of study, design and mark final examinations, set up field trips, field days and other "special" year-end activities. Despite this, our monitors found most respondents cooperative. Some respondents were very conscientious in the detailed effort they gave to the questionnaire, increasing the time for their completion beyond our estimates.

The questionnaires appear in summary form in Volume 2 of this report. They have the following characteristics:

1. The respondents and their institutions were assured anonymity.
2. The respondents were encouraged to comment throughout the questionnaire. Where the questions restricted the scope of their answers, additional space was left at the end of each questionnaire to allow each respondent to describe his course more fully.
3. History, histoire and French questionnaires took approximately 20-30 minutes to fill out; English, Français and Anglais approximately 45-60 minutes; Mathematics, Mathématiques, Physics and Physique, 1½-2 hours.
4. All questionnaires were divided into 4 discrete sections (except French and Français which were set out in 5 sections). Section I contained items concerning the background of the instructor, including professional training and experience. Section II, entitled "Course Planning and Instruction", contained items concerned with factors which influence the teaching of the course, teaching methods and resources utilized teaching the course, characteristics of incoming students, and methods of student assessment. Certain items in Section II of the questionnaire differed, depending on the subject and/or institutional level. Section III asked the respondent to estimate the emphasis given in the course to specified aims. Section IV sought information about the organization of the course and the level of difficulty to which content

was taught. Sections III and IV were treated in a way thought to be appropriate to the particular subject. Thus, while physics questionnaires contained 165 specific content topics arranged under 21 major headings, and the mathematics table contained over 200 items arranged according to the course to which the content normally applied (7 major categories in all), in history, English and French this section contained a much smaller number of items, primarily skill objectives.

Section IV of the questionnaire was a challenge to both designers and respondents. This section of the questionnaire asked respondents to rate each item according to the "average level" of competence of incoming students and of these same students upon completion of the course. Although instructors do teach groups, many found it difficult to perceive an "average level" for the group of individuals they were teaching. The matter was complicated by two additional stipulations: (1) the respondents were to think of their courses as part of a continuum; however, (2) this continuum was to begin and end with the courses encompassed by a particular interface. Thus the year 4 teacher was to rate the level of competence of his students on the items with respect to his course and to the first year college course with which it formed an interface. Similarly, the university instructor was to think of a range of abilities between a year 5 secondary school course and the end of the first year university course. Response categories (see the questionnaires in Volume 2 for response keys) for this task varied from 5 response categories in history and physics to 7 in English. A typical response key ranged from "No knowledge" to "Complete mastery." The respondent was required to assess the average level of competence of students at entry into the course on each topic and again at exit. If there was a difference of one or more points on this scale between entry and exit we assumed that the topic or objective had been taught. The respondent was also asked to fill in a "preferred" entry and exit level; that is, the entry level he/she would prefer incoming students to have achieved and how far he/she could have taken them, given this entry level.

INTERVIEW SCHEDULES

Department Chairmen

Specific data on changes over time in course content, evaluation of students and student characteristics were not readily available from institutional records. A series of interviews were conducted, between July and October, with subject department heads in the university sample, subject supervisors in the college sample, (deans, department chairmen, coordinators) and department heads in a subsample of 20 secondary schools. In all cases, either a department chairman or senior member of the department was interviewed. All but 3 interviews were conducted through a personal visit to the school; the 3 other department heads were interviewed by phone.

At the secondary school level the number of schools involved in the study and the fact that department heads could only be reached in the fall when they were also busy with teaching responsibilities restricted the number of interviews. A sample of 20 secondary schools, geographically representative, were visited. Again interviews were requested with all department heads of subjects selected for this research. Copies of the interview schedules can be found in Volume 2.

Registrars

At the same time as visits to department chairmen were undertaken, registrars of all universities and colleges involved in the study were interviewed to obtain trend information on student achievement, course enrolments, admission patterns, and policies.

RATING VALIDATION INSTRUMENTS

One part of our analysis hinged on the consistency with which the rating scales on the questionnaire were applied by the respondents. The average level of achievement of students at both sides of an interface had to be assessed with consistency if meaningful judgments were to be made regarding the appropriateness of preparation of students at one level for efficient achievement at the next. There are many examples of teachers disagreeing on the performance level of students on particular pieces of work.* This

*R. M. W. Travers, ed., Second Handbook of Research in Teaching (Chicago: Rand McNally, 1973), 1007.

factor plus the normal problems of rating scales* reduced the likelihood that teachers would rate students' "average level of competence" consistently and with essentially the same meaning for each point on the rating scale.

Since we did not expect instructors at institutional levels on both sides of each interface to apply the response key in exactly the same way, then estimated exit levels of student competence from secondary school courses had to be compared with estimated entry levels of student competence to university or college courses with great caution. In order to further clarify this issue, subject experts were consulted and rating validation instruments were developed, pretested and revised for use in English, French and mathematics. They consisted of a series of sample questions and/or student answers varying in difficulty or level of competence displayed.

The rating scales were designed to shed light on two fundamental questions: (1) Could instructors at all levels agree on the level of competence of students, given a standard scale? (2) Could our questionnaires' responses be adjusted to take into account consistent patterns of rating across institutions and within each institutional level? The instruments are presented and analyzed in detail in Volume 2. They are also discussed where applicable in the subject sections that follow.

Test and teacher questionnaire data from Project II were used to clarify and elaborate upon our data based on the questionnaire rating scales and rating validation instruments.

OTHER SOURCES OF DATA

Calendars

We requested that the institutions selected for the study supply us with copies of institutional calendars for up to 10 years. Our purpose for including this information was to identify trends in course offerings, course content, admission policies, prerequisites and corequisites.

In the case of the secondary schools we expected to receive calendars from 1971 to the present. Schools followed a common core program before that time and in very few instances published calendars. Every school was

*Claire Selltiz, L. S. Wrightsman, S. W. Cook, Research Methods in Social Relations (3rd ed.; New York: Holt, Rinehart and Winston, 1976).

able to supply us with current calendars, but only 14 provided us with a full set of calendars back to 1971.

We received calendars going back 10 years from seven universities and current calendars from all sampled universities. Very few colleges were able to provide us with calendars going back 8 years and we had to use Ministry of Colleges and Universities' files for our trend analysis.

Courses of Study and Examinations

We requested each institution to provide us with courses of study, examinations, and copies of student course requirements for up to ten years in the subjects studied.

The returns in response to this request were quite good from secondary schools and universities but not from the colleges.

These data were used to test the validity of the questionnaire (to ensure the questionnaire allowed each instructor to accurately describe his/her course and to determine if changes in course content and emphases had taken place over the past few years). The examination data were used to investigate the relationship between what was formally examined and the content outlined in the courses of study.

The lack of completeness of these data was a primary reason for the initiation of the department head interviews.

Ministry of Education Records

Part of the trend information required for this study related to changes in marks assigned to secondary school students and patterns of course enrolments in year 4 and 5 of the secondary school. Enrolment and student mark data for year 5 students were readily available from Ministry records for the past ten years. Year 4 enrolments were not available by course before 1971 because students were classified by program. Year 4 enrolment data from 1971 to the present provided a good picture of trends associated with the credit system. Further attempts to collect information before 1971 are only useful at the program level (example: in 4-year Arts and Science, 5-year Business and Technology).

Student marks information was difficult to summarize. We identified the schools using the Ministry of Education Mark Reporting Service from 1973 to 1976 (56 schools were selected for our purpose). We traced those schools back to Ministry records for 1964, 1967, and 1970 data. Permission was obtained from each school to use data stored for them by the Ministry for 1973, 1975 and 1976 and this was summarized. Failure rate data was not available for 1973 and 1975 and these figures had to be estimated from data collected in previous studies.

Physics data were recorded in combination with chemistry for 1964 and 1967 but separated from 1970 on.

Ministry of Colleges and Universities

Program enrolments from 1962/3 to 1975/6 for the universities were obtained from the Ministry of Colleges and Universities through their association with Statistics Canada. College program enrolments from 1970-1975 were also supplied to us.

Coordinating Mechanisms

Data from Project I, along with the department head and registrar interviews, were used in the analysis of organizations and procedures designed to coordinate curricula and the evaluation of student achievement within institutions and across the interfaces.

QUESTIONNAIRE AND RATING VALIDATION INSTRUMENT RETURNS

The return rates for the questionnaire and rating validation instruments have been summarized in Table 2.3. The returns for the English secondary school questionnaires would have been higher, but as a result of some confusion in one of the schools only 6 of the 13 questionnaires were available on the day they were to be filled out. No one in the secondary schools refused to fill in a questionnaire but 1 respondent in a French school chose to fill in only 1 of 2 questionnaires. However, there was a great deal of concern evidenced over the time of year selected for the research and the amount of time required to fill out some of the questionnaires.

Two college respondents refused to fill in questionnaires and it was not possible to contact 2 others. Five university respondents chose not

to fill in the questionnaire and 11 respondents were not available.

The response rate for the rating validation instruments in English secondary schools closely paralleled that of the questionnaires. Every respondent in mathematics, English and French who filled in one filled in the other.

The return rates for the rating validation instruments in the colleges and universities were influenced by the fact that they were administered after the questionnaire and in some cases after the institutions had completed their winter program and some instructors had left. Nevertheless, the return rate was remarkably high.

TABLE 2.3

RETURN RATES FROM QUESTIONNAIRES
AND RATING VALIDATION INSTRUMENTS

Instrument	Number of Courses Surveyed (e.g., English Colleges: Math, Physics, English = 3)	Instruments Sent Out	Percentag Return
Questionnaires			
English secondary schools	13	663	97%
French secondary schools	13	167	99
English colleges	3	142	97
French colleges	2	7	100
English universities	5	138	90
French universities	4	20	90
Rating Validation Instruments			
English secondary schools	3	458	96
English colleges	2	108	94
English universities	3	95	82

Data Analysis

QUESTIONNAIRES

The French-language secondary school, college and university and English-language university questionnaires were tabulated by hand. The English secondary school and college questionnaires were keypunched and then tabulated by computer. Most of the data have been presented in simple bar graph or tabular form.

We have used a number of response keys in our questionnaires (e.g., see keys for course aims, factors influencing teaching). Obviously equality of units on these keys is a desirable property but there is very little likelihood that this is the case. A "moderate emphasis" response is not twice as strong as a "little emphasis" response. Nevertheless a mean and a standard deviation does provide us with an indication of how the numbers assigned to these response categories are distributed. In a few instances we have chosen to present means and/or standard deviations for what is clearly ordinal information (rank-ordered categories but not necessarily equal intervals). We have tried to interpret these statistics cautiously and to provide further information on the distribution of the responses when required. We encourage the reader to be equally cautious.

A standard procedure was used to estimate whether a particular topic was taught directly or indirectly in a course. If there was a positive difference of one point or more on a topic in the rating scales used in Section IV of the questionnaire (between estimated average level of competence of students at exit and average level of competence of students at entry to the course) then it was assumed that the topic or content had been taught. In addition, detailed information was requested on time allocated to particular topics/objectives in physics/physique, mathematics/mathêmatiques and French questionnaires and more general information on proportion of time assigned to broad topic areas in the other questionnaires.

In our pretests we found that many instructors preferred not to indicate the topics that might best be taught at each institutional level. Therefore we explored this problem from a different tack. It was decided that some indicator of preference with regard to the quality of preparation of incoming students in

each topic/objective would be useful as an index of satisfaction with particular aspects of the students' preparation. For each topic we subtracted each instructors' ratings of actual level of average student competence at entry in a course from his/her preferred level of average student competence. A percentage was determined based on the proportion of instructors who preferred a higher level of average student competence at entry into a course. This provided us with an "extent of satisfaction with student preparation index" for each topic area.

An analysis of means and standard deviations of the ratings of actual student competence along with the information on whether a topic was taught or not were the primary data on which the discussion of consistency in the teaching of topics in courses at an institutional level was based.

Since there was evidence from our analysis of the rating scales of high variability in the application of the rating scales and substantial differences in the means of some of the entry/exit rating groups, they have been interpreted very cautiously. Data from Project II also indicated that caution should be used in interpreting instructor ratings. It was found that for some topics the instructors judged that the students did not know a particular topic area but that the results of the testing program indicated that they did. And there were also examples of the reverse pattern. Therefore data dealing with the accuracy of rating of levels of average student competence were bolstered by information from the rating validation instruments and testing program of Project II.

RATING VALIDATION INSTRUMENTS

It was hoped that the rating validation instruments would reveal that if discrepancies between secondary and post-secondary instructors' use of the response key existed, the differences would be uniform for each item or on each scale. This would enable us to either adjust the average ratings accordingly or use this information in our interpretation of the interface.

It was found that there were differences of up to half a rating-scale point between year 5 secondary school teachers and year 1 university instructors of mathematics and between year 4 teachers and both college and

university instructors in English. These differences were taken into account in considering the interfaces in these subjects. Ratings of the items on the French instrument were not appreciably different on either side of the interface.

It should also be noted that the rating of hypothetical questions and/or responses is not the same thing as rating the average level of student competence at entry and exit in a course. If differences in the application of the ratings do exist, they may not be quantitatively reflected in the rating validation instruments. This may be especially true when the rating of the competence of one's students is to some extent a rating of one's own success as a teacher.

GENERALIZING FROM THE DATA

Standard statistical procedures were not applied to ascertain the significance of differences manifested among the data except in the case of the rating validation instrument item analysis. Diversity or consistency of topic coverage in the courses of the sample is noted when a clear pattern is present in a visual analysis of the tabular material. In each subject section of the report the characteristics of the courses studied are described in detail as they relate to the total course offerings in each subject area in the institutions studied and across the province.

Means are presented in many instances (e.g. for aims of the course, average level of student competence at entry) and this approach could obscure anomalies in the distribution of responses. However, the full distributions are presented in the tables in Volume 2 and unusual patterns in the distribution of ratings are noted in this volume.

A note of caution must be introduced in considering the data from the French institutions. The development of instruments was delayed by difficulties in obtaining suitable translations and consequently the administration of the instruments was delayed to very late in the school year or after in the case of the post-secondary institutions.

Our approach to the analysis of subject coordinating mechanisms (subject teacher associations, consultants, etc.) was basically descriptive. However we do extrapolate from the data to consider what types of coordination might be suited to certain purposes.

Presenting the Findings

The findings have been organized for presentation by subject area. In order to introduce all the descriptive data that we were required to collect and still present a logically integrated report we chose to apply the following format. After the sample of courses is described, factors (e.g., background and experience of instructors) that might influence the content and teaching methods of a course are presented. Then a detailed description of the characteristics of the course in each grouping follows and the extent of variability is discussed. The interface analysis is premised on the discussion of variability in course groupings on each side of the interface.

The analysis of the two Français interfaces has been written in French. This included the year 4 secondary school advanced and general Français courses with the year 1 college Français courses, and the year 5 secondary school Français courses with the year 1 university Français courses. Mathématiques, Anglais, histoire, and physique have been treated, along with their English counterparts, in English. Francophone aspects of those four subjects have only been touched on tentatively in discussion with individuals from the Francophone community who contributed to the design of the questionnaires.

The analyses and discussions of trends over time and the current status of mechanisms designed to coordinate curricula in Ontario are each presented in separate sections. The report concludes with a discussion of the implications of the findings for educational decision-making.

3 English and Anglais

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SECONDARY SCHOOL ENGLISH/ANGLAIS YEARS 4 AND 5

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SECONDARY SCHOOL ENGLISH/ANGLAIS
YEARS 4 AND 5

A. The Sample

Four types of secondary school English and Anglais courses were examined in our sample of 53 English schools and 14 French or bilingual schools. In three, English was taught as a first language at year 4 General and Advanced levels, and year 5*, and in one, English was taught as a second language, Anglais year 5. From the French-language school calendars and the questionnaire responses, Anglais looks very much like English in English language schools. A basic similarity of objectives makes it possible to present the data for English and Anglais side by side. There were 49 4G courses surveyed, 51 4A courses, and 51 year 5 courses. One year 5 Anglais course was surveyed in each of the 14 French schools.

The nature of senior English courses has changed as a result of historical events. Until 1966, students in grade 13 English wrote compositon and literature as two separate Departmental examinations, each for one credit. In 1966, both composition and literature were combined into one examination for two credits.

By 1967, the Departmental examinations were phased out and the autonomy of local school boards to make curricular decisions was substantially increased. English department heads were given the responsibility to modify existing courses and to develop new ones when it was warranted by local conditions.

With the introduction of the credit system, three significant events transpired. Previously, students had been expected to take a total of seven or eight English periods per week in Grades 12 and 13; 3 were to be devoted to composition, and 4 (in Grade 13 this could be 5) were to deal with literature. The total number of periods per week for one English credit in the credit system was reduced to 5. Second, courses previously regarded as

* The English courses will be referred to in this report as 4G, 4A and year 5.

supplementary ones, e.g., Twentieth Century Drama, were given credit value equal to that of the traditional courses. And third, students were granted greater freedom in course selection. Teachers wishing to encourage students to choose the maximum number of English credits were challenged to create separate courses, different from the traditional composition and literature credits that the Departmental examinations had required.

The Senior Division guidelines (RP-S4)[1] were consolidated in a revised edition in 1967 that was designed to be prescriptive but also to assist the English teachers of four-year and five-year programs with imaginative thematic treatments and suggestions for course development.

Curriculum S4 (13)[2] also referred to as a guideline, was published in 1968 as a new resource booklet for year 5 English teachers. These documents remain the only senior English Ministry of Education guidelines. The tone of the latter document appears far more tentative than that of RP-S4, undoubtedly reflecting the movement toward decentralization in curriculum design. Both documents fostered the variety of special interest English courses which exist in Ontario secondary schools today.

The first and only guideline produced to help teachers of Anglais develop courses for teaching English to Francophones was published in 1970. Before this, the only guidelines to which Anglais teachers could refer were RP-S4 and S4 (13). The 1970 Anglais guideline is a 14-page document providing suggestions for approaches to teachers of pupils from Kindergarten to Year 5 secondary school. It also attempts to express the special requirements needed for the teaching of English as a second language. The design of some Anglais courses was influenced by staff entering French schools from English ones. In practice, Anglais department heads came primarily from two sources: English-language secondary schools and English department headships in French private schools which became public or had ceased to operate.

[1] Although the terminology about four-year and five-year programs, branches and references to the total number of periods in a week are outdated, the 155-page Curriculum RP-S4 contains, primarily, principles to be considered in building four year and five year courses, and suggestions about the study of literature, composition and language study.

[2] Curriculum S4(13) is a brief 12-page document listing aims, information about methods for developing courses including four sample electives, and themes for individual studies.

1. POPULATION OF COURSES

Since the credit system was introduced, the number and type of English courses have proliferated. School calendars were analyzed for descriptions of English courses offered at each level and year in our sample of schools. The description of a course in a calendar does not, of course, guarantee that the course was actually taught; a low enrolment may have resulted in its cancellation. Nor are calendar descriptions always detailed or accurate. Nevertheless, the 1975/76 calendar descriptions of courses offered in the sample schools do reflect the focuses of years 4 and 5 English and year 5 Anglais (see Table 3.1). We identified Anglais as the English course(s) taught in French or bilingual schools. In fact, nine of the 14 courses surveyed were called "English".

Courses with a combination of literature and composition were classified as either "traditional" or "special". The term "traditional" was used to classify literature studies using more than one approach combined with formal essay writing.

The "special" literature/composition classification included single approaches to literature, such as courses that were organized by a genre, a mode (e.g., tragedy) and a theme along with essay, creative or practical writing. The "composition" category entails pure composition, creative and/or practical writing.

Seventy-two percent (67) of the 4G, 80 percent (89) of the 4A, 93 percent (119) of the year 5, 91 percent (28) of Anglais courses offered fell into the first two categories (literature plus composition). Forty percent of the 4G and approximately one-third of the 4A special courses offered were described as thematic studies. The 4G courses covered a range of periods and genres and included topics such as "Man and His Environment", "The Criminal Mind", "The Dilemma of Love", mythology and science fiction. The 4A thematic courses included such sophisticated topics as "The Adult Parent and the Adult Child in Conflict". Nine other types of special 4A literature/composition courses were identified; the most common were Canadian literature, survey and contemporary studies. Also classified as special were four "student-developed programs". These allegedly provided the student with the opportunity to choose material and design his course of study to suit his needs.

TABLE 3.1

SECONDARY SCHOOL ENGLISH/ANGLAIS
COURSES IN THE SAMPLE OF SCHOOLS

Course	Year 4 General		Year 4 Advanced		Year 5		Year 5 Anglais	
	Offered	Selected	Offered	Selected	Offered	Selected	Offered	Selected
Traditional Literature/composition	19	16	27	22	34	23	7	5
Special Literature/composition	48	27	62[c]	29	85	28	21	8
Composition	9	4	6	0	1	0	1	0
Other (Drama. Arts, Media, Film)	18	2	16	0	8	0	2	1
Total	94[a]	49	111[b]	51	128	51	31	14

N.B. Only significant numbers of half or third-credit courses within subclassifications will be noted.

[a] 15 (16%) of these courses and 4 of the surveyed courses were one-half or one-third-credit courses.

[b] 22 (20%) of these and 5 of the surveyed courses were one-half or one-third-credit courses.

[c] 11 (23%) of these courses were one-half credit and 4 (7%) were one-third-credit courses.

Twenty-seven percent of the year 5 courses consisted of literature studied through a variety of approaches; the remaining two thirds were organized according to theme (15 percent), by period or mode (13 percent), as Canadian literature courses (17 percent), or as survey courses (18 percent). Three "student developed programs", one reading course and a study of the Bible as literature were also offered.

In Anglais, of the 21 "special" literature/composition courses offered, 12 were Canadian literature, two studied literature by a theme and 5 were courses which presented a combination of literature/composition, media, film and/or language studies.

1. *NATURE OF THE SAMPLE*

We attempted to select those courses in which the majority of students were enrolled and, where more than one course was offered, we selected the course closest in content to a traditional literature/composition course if it had an enrolment at least equal to others offered at the same level. The types of English courses surveyed adequately represent those taken by the majority of senior secondary school students.

Eighty-eight percent of the courses surveyed in 4G, 100 percent in 4A and 5, and 93 percent in Anglais were literature/composition in classification.

In the "special" literature/composition classification, surveyed courses represented the various organizational approaches found in the population of courses. Thus 44 percent of 4G, 25 percent of 4A, 17 percent of year 5 courses and 2 Anglais courses surveyed were thematic in approach. Ten percent of 4A and 5 percent of year 5 courses selected dealt with Canadian literature, 3 "student-developed programs" were surveyed in 4A. One Anglais course offering a comparative study of English literature with other art forms was sampled.

B. Factors Influencing the Teaching of Courses

1. BACKGROUND OF THE INSTRUCTORS

The characteristics of secondary school English and Anglais instructors are set out in Figures 1 and 2. It is clear that they constitute an experienced group and, in the case of year 5 teachers, a relatively senior group: over 50 percent of year 5 teachers were department heads or assistant department heads. A large majority of English and Anglais teacher respondents from the secondary school sample had taught for over six years. Many had taught during the time of Departmental examinations, a recognized controlling force in the design of senior English curricula. Nearly all of the teachers had taught the course for two years or more.

It is interesting to note that a substantial number (18 percent) of year 4A teachers had previously taught at the university level; between 7 and 10 percent of all other groups had done so. These teachers may be more aware of the interface problems in English than those who had not previously taught at university.

For the great majority of English or Anglais teachers, the courses they described were within their area of specialization; although in 4G, 13 percent of the respondents indicated they were not teaching in their area of specialization.

About 80 percent of the year 4A and year 5 English teachers were in OSSTF category 4, while only 55 percent of year 4G teachers fell into this category.

At least 80 percent of the year 4A and year 5 teachers had obtained at least an Honours Bachelor's degree and almost a third held Master's degrees. More than half of the 4G (53 percent) and year 5 Anglais teachers (64 percent) had an Honours or a Master's degree.

2. PREREQUISITES OF THE COURSE

About the same percentage of 4G (59 percent) and Anglais teachers (57 percent) stated that prerequisites to their courses were required or strongly recommended. Calendar descriptions, however, specified prerequisites for 75 percent of the surveyed 4G courses. The discrepancy in the

Figure 1

BACKGROUND OF TEACHERS

SECONDARY SCHOOL ENGLISH
PERCENTAGE OF TEACHERS IN EACH CATEGORY

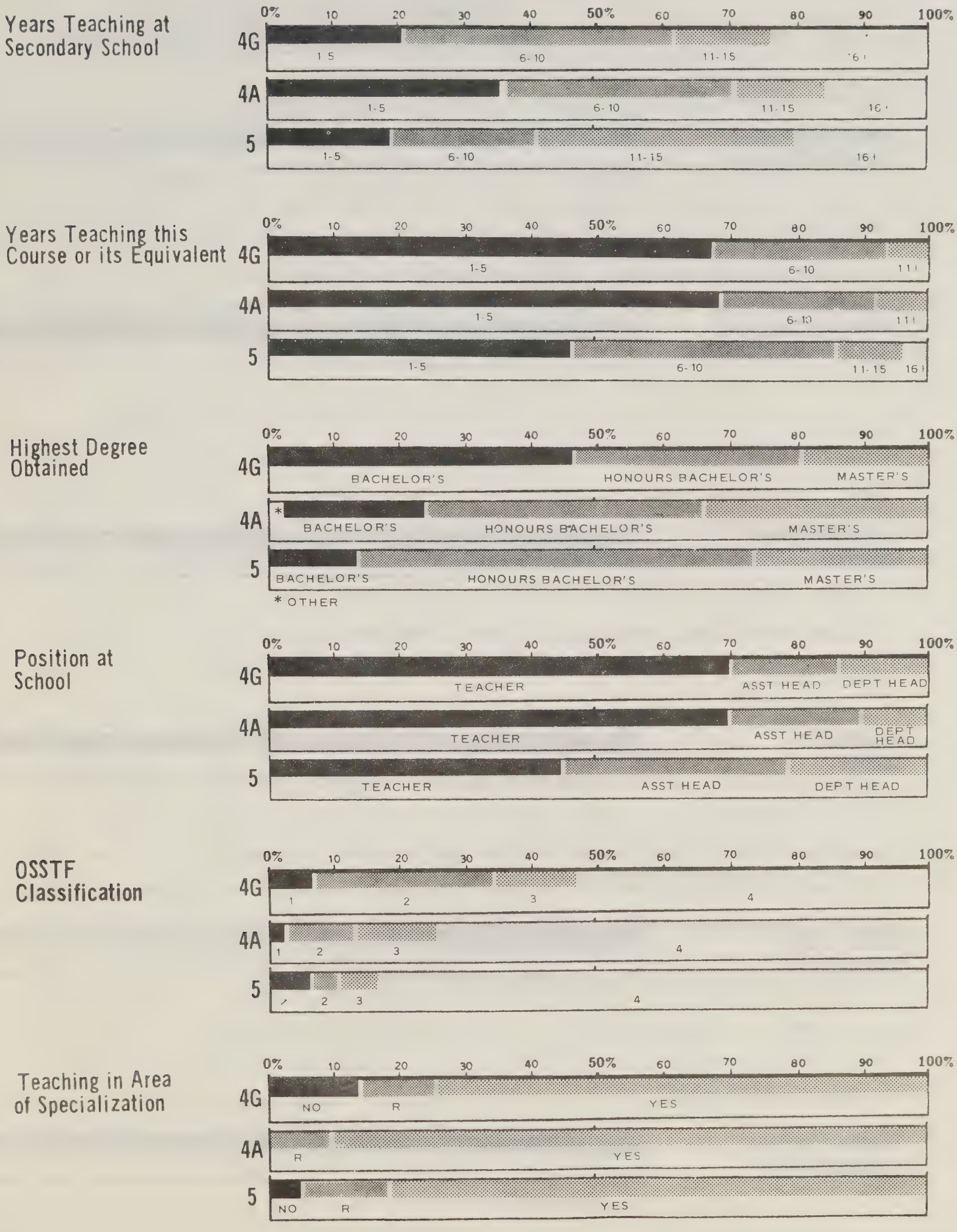
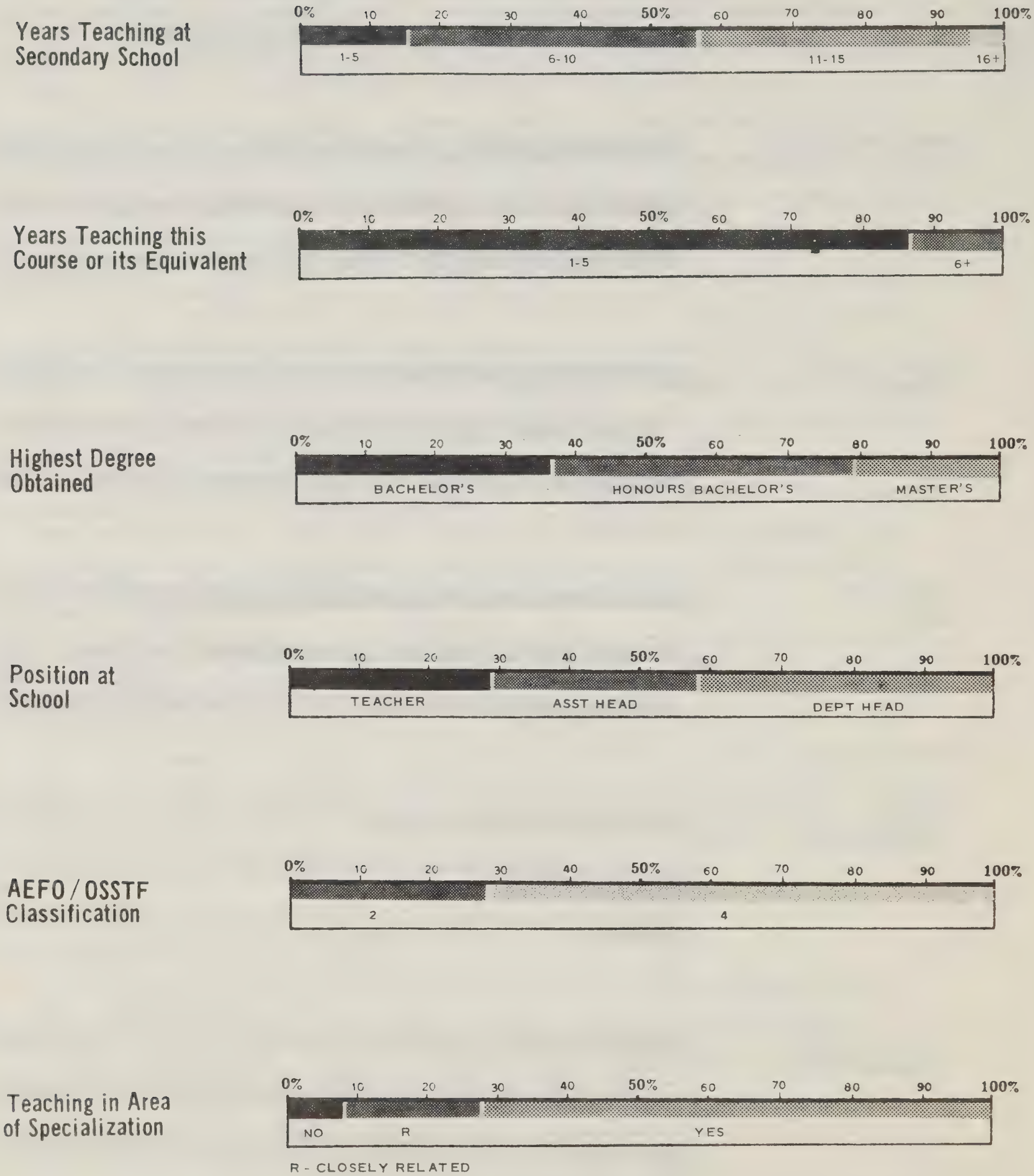


Figure 2

BACKGROUND OF TEACHERS

SECONDARY SCHOOL ANGLAIS YEAR 5
PERCENTAGE OF TEACHERS IN EACH CATEGORY



case of the 4G courses may lie in the fact that guidance counsellors often ask teachers to permit entry to students who do not have the prerequisites but appear to have the ability. Eighty-four percent of both 4A and year 5 English teachers declared that their courses required or strongly recommended prerequisites.

The most common prerequisite was a course of the preceding year or semester at the same difficulty level (close to half of the courses in 4A, year 5 and Anglais with prerequisites; but only 26 percent of 4G courses). In 10 percent of 4A and 12 percent of year 5 courses requiring or recommending prerequisites more than one course was stipulated from the preceding years or semesters at the same difficulty level. The 4G courses generally did not appear to require or recommend prerequisites as demanding as the 4A or 5 courses.

3. CHARACTERISTICS OF INCOMING STUDENTS

Except in the case of some vocational students, "streaming" students into a specific level at which all courses are taken no longer exists. It may happen that a student takes the majority of his courses at the general or advanced level, but he/she is not formally labelled a "general" or "advanced" student. Most 4A students would be planning to continue to year 5 but some may intend to go to a college. Most 4G students plan either to go to college or leave school after completing the year.

(a) Variability

English department heads suggested some explanations for variation in the abilities of their incoming students. Their comments, considered in the context of the students' progress through the school, provide an interesting background to the data about variability. Because prerequisites are not adhered to in every case, a given senior English class may enrol some students with poor preparation in English and others who are very well prepared. "Some write at a university level...others at a junior high level," commented one department head. In many schools, students have a wide choice of English courses with loosely specified prerequisites or none at all; one department head believed that "some students may have made unwise decisions in their course selection".

Teachers were asked to assess, in a very general way, the amount of variability that they perceived among incoming students.

TABLE 3.2

SECONDARY SCHOOL ENGLISH/ANGLAIS
AMOUNT OF VARIATION AMONG INCOMING STUDENTS

Response	% of Teachers Responding			
	4G	4A	5	5 Anglais
Very little	4%	4%	2%	0%
A moderate amount	14	29	40	29
A great deal	82	65	58	71

Over 94 percent of respondents perceived a great deal, or a moderate amount, but teachers in the different courses reached no consensus about the degree of variability. In fact, the degree of variability decreases as difficulty and year level increase. Many more (82 percent) of the year 4G than 4A teachers (65 percent) considered their students' abilities varied a great deal and only 58 percent of the year 5 teachers. However, ten of the 14 year 5 Anglais teachers perceived a great deal of variation in students' abilities.

This general information can be supplemented by data drawn from Section IV of the questionnaire (see Section C for the list of objectives and discussion) where teachers were questioned in detail about student levels of competence at entry and exit. According to these reports by teachers of English, in certain objectives there was high variability from school to school in the level at which their teaching had to be aimed. The high variability in the average level of competence at entry into the courses should have some effect on the level of competence which students attain by exit. The data do indicate that for many objectives the average exit level of students' competence is highly variable from school to school.

(b) Quality of Preparation

TABLE 3.3

SECONDARY SCHOOL ENGLISH/ANGLAIS
QUALITY OF PREPARATION OF INCOMING STUDENTS

Response	% of Teachers Responding			
	4G	4A	5	5 Anglais
Excellent	2%	2%	2%	0%
Good	27	46	55	36
Fair	60	42	43	36
Poor	11	10		7
Variable[a]				21

[a]This category was not part of the original item. It was added because of some teachers' responses.

Generally speaking, the large majority of English and Anglais teachers declared that the quality of preparation of their incoming students ranged from fair to good. However, almost three quarters of the 4G teachers described students' preparation as fair to poor. The high percentages of 4A and 5 year teachers (more than 40 percent) who described the quality of their students' preparation as only fair is notable.

Teachers' general impressions of students' quality of preparation are substantiated in the analysis of teacher ratings of the level of student competence preferred at entry. But to another general question about the knowledge, skills and attitudes of incoming students, at least half of the 4A and year 5 English and Anglais teachers (50 percent, 52 percent and 65 percent) expressed moderate satisfaction with some of the skills. (Only 37 percent of the 4G teachers concurred on this point.) Some stated that students were well prepared in character analysis, oral skills and ability to plan answers. About 40 percent of the teachers in all four courses claimed that the attitudes of students were desirable;

those teaching 4A and 5 students said that they displayed genuine interest in literature.

Almost half (45 percent) of the 4G and year 5 Anglais (43 percent) teachers claimed their incoming students were poorly prepared in some areas of knowledge; vocabulary and sentence structure were two cited. Lack of self-discipline or a serious approach to work and lack of attention to detail were mentioned by those who complained of attitudinal weaknesses.

It was in the area of skills, especially writing and other language skills, that most of the English and Anglais teachers felt students should have been better prepared. Over 75 percent of the teachers declared that they received students who were poorly prepared in this area.

Further evidence of teachers' dissatisfaction can be found in their responses in Section IV of the questionnaire (Tables 3.4 and 3.5). Teachers were asked to rate a number of specific objectives in terms of the actual level of student competence and the level which they would have preferred at entry to their courses. The difference between those two ratings gives us some measure of dissatisfaction. In the tables the objectives have been combined in clusters.

TABLE 3.4

SECONDARY SCHOOL ENGLISH
PERCENTAGE RANGES OF TEACHERS PREFERRING
A HIGHER LEVEL OF STUDENT COMPETENCE AT ENTRY

Topic	% Range of Teachers														
	4G					4A					5				
	81-100	61-80	41-60	20-40	<20%	81-100	61-80	41-60	20-40	<20%	81-100	61-80	41-60	20-40	<20%
Literature (9)[a]		8[b]	1			3	6				6	3			
Comprehension (3)		3				1	2				2	1			
Reading (2)	1	1				1	1					2			
Writing (18)	4	7	5	2		9	3	4	2		7	5	2	4	
Oral Work (6)		5	1			3	2	1			1	3	1	1	
Language Study (2)		1	1			1	1				1	1			
Research Techniques (2)		1	1				2						1	1	
Media other than literature (2)			1	1				1	1						

[a]No. of subtopics in each cluster given in parentheses
[b]No. of subtopics within each % range

TABLE 3.5

SECONDARY SCHOOL ANGLAIS YEAR 5
PERCENTAGE RANGES OF TEACHERS PREFERRING A HIGHER LEVEL
OF STUDENT COMPETENCE AT ENTRY

	% Range of Teachers				
	81-100	61-80	41-60	20-40	< 20%
Literature (3)[a]				3	
Comprehension (2) Analysis		2			
Reading (2)	2[b]				
Writing (14)	2	6	3	2	1
Oral Work (6)		2	2	2	
Language Study (3)		3			
Research Techniques (2)		2			
Media other than Literature (13)			3	9	1

[a] No. of subtopics within each cluster given in parentheses

[b] No. of subtopics within each % range.

In general, over 60 percent of English and Anglais teachers stated that they were dissatisfied with the entry level of competence in most (115 of 175) of the objectives. In some cases, teachers were highly dissatisfied, having preferred students' average level of competence at entry to be at least two points higher on the rating scale. To be more specific, the majority of English/Anglais teachers would liked to have seen an improvement in over half of the objectives in literature, comprehension and analysis, reading, writing and oral work.

4. *OTHER FACTORS INFLUENCING TEACHING*

Teachers were asked to estimate the influence of a list of 9 general considerations upon their teaching of the course. The responses are summarized in Table 3.6.

For all courses, the special interests or training of the teacher ranked either first (for 4A and year 5 English and Anglais) or second (4G). We have already seen that English/Anglais year 5 teachers in particular were highly qualified and, to a great extent, teaching within their area of specialization--facts with which their rating is quite consistent.

Interests of students influenced more than 80 percent of English and Anglais respondents' teaching at least moderately. It influenced approximately 50 percent of them to a moderate extent and 22 to 57 percent to a great extent.

Given the special complexity of the post-secondary future of the Francophone student, it is not surprising that year 5 Anglais teachers rated as influential the information they had concerning their students' future plans; at least 80 percent of Anglais teachers appeared to make special efforts to keep informed about post-secondary careers and programs for their graduates.

Because teachers, particularly of 4G, indicated that they were greatly influenced by students' knowledge of the subject and because of their concern noted earlier with poor or only fair preparation in skills, one might infer that this particular area would be given a great deal of attention in all courses. Teachers' responses to other items of the questionnaire indicate that this did not always prove to be the case.

Examination of questionnaire comments leaves one unsure about the respondents' interpretation of the item "content and approach of principal text(s)", especially since most teachers used more than two literature texts. This item might refer either to the original selection of texts - presumably dictated by the course objectives - or to the manner in which the approach of the text would influence the content of the course. We must therefore, be cautious in interpreting the fact that 60 percent of the English and 80 percent of the Anglais teachers claimed to be influenced to a moderate or great extent by the content and approach of their principal texts.

TABLE 3.6

SECONDARY SCHOOL ENGLISH/ANGLAIS
FACTORS INFLUENCING THE TEACHING OF THE COURSE

Factor	4G		4A		5		5 Anglais	
	WM[a]	R[b]	WM	R	WM	R	WM	R
Interests of students	2.4	1	2.0	2	2.1	3	2.5	1
Students' knowledge	2.1	2	1.9	4	2.2	2	2.1	3
Relationship to concurrent courses	1.2	8	1.2	7	1.1	8	1.4	6
Information on students' future plans	1.3	6	1.5	6	1.6	6	2.1	3
Ontario Ministry of Education guidelines	1.3	6	1.0	8	1.4	7	1.2	8
Assigned course outline	1.9	4	2.0	2	1.8	5	1.4	6
Teachers' special interests or training	2.1	2	2.1	1	2.4	1	2.5	1
Principal text(s) (content and approach)	1.8	5	1.7	5	1.9	4	2.1	3
Staffing	0.6	9	0.4	9	0.5	9	0.6	9
Other	0.1	10	0.3	10	0.5	9		

[a] WM=weighted mean. Each category was assigned a weighting: 0-not at all; 1-to a small extent; 2-to a moderate extent; 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b] R=rank. Factors were ranked on the basis of weighted means.

Both the Ontario Ministry of Education guidelines for senior English (Curriculum RP-S4 and for year 5 English, Curriculum S4 13) suggest principal approaches and texts to be considered in designing English curricula. Neither, according to H.S.1 (1974/5), is in print, pending further revision, and we understand that copies have not been readily available to teachers in the schools for some time. Moreover, individual English departments have been at liberty to modify or design curricula, and it is evident the guidelines have been principally interpreted as resources. Under the circumstances, it is not surprising that about half to two-thirds of the English teachers responded that their teaching either was not at all, or only slightly, influenced by Ministry guidelines.

The sketchy Anglais year 5 guideline described earlier outlines areas of emphasis in the program, teaching approaches, a model for developing a course unit and suggestions about making use of television, a news story and films. Half (7) of the Anglais respondents claimed that the guidelines influenced their teaching to a moderate or a great extent. Four of them were not at all influenced.

Staffing was a very minor factor and was mentioned mainly in connection with such matters as qualifications and timetabling. Team or cooperative teaching was mentioned by 5 year 5 and 4A teachers.

Five of the 8 4G teachers who claimed that other factors greatly influenced their teaching specified their reasons for teaching the course, rather than matters of approach; e.g., their ability to relate to this type of non-academic student. Five 4A and 9 year 5 teachers specified other influential factors, including a desire to develop an awareness of Canadian culture, and the diversity in skill needs of their students.

C. Characteristics of the Course

The selection of aims and specific objectives comprehensive enough to allow teachers at all three institutional levels to describe their courses accurately within a reasonable time frame proved a challenging task. Items had to be brief and yet precisely worded to avoid ambiguity. Aims and objectives which sounded commendable but which were not treated in most

English courses at any level, or high-sounding aims and objectives which would merely lengthen the questionnaire without enlightening the research team, had to be eliminated.

As it turned out, the specific objectives presented more of a problem than the aims; they will be discussed later.

1. *AIMS*

The aims are, by necessity, very general, but cover most of the areas of concern in the field of English; teachers could add aims if they thought that the list was not complete.

Most respondents indicated that they emphasized most of the aims. Table 3.7 makes it clear that the weighted means for many aims listed in the questionnaire are quite similar, so that we cannot make fine distinctions in their rankings. We should also be aware that these aims are very broad goals, which are, in many cases, difficult to measure accurately and that because teachers claim to emphasize them does not mean that their students actually gain in knowledge, skills or attitudes.

The aim of primary emphasis in the English and Anglais courses was "to promote fluent and grammatically acceptable written English." Also of primary importance in 4A and year 5 courses were "to think critically and developing the student's ability to organize and integrate ideas and materials". The last two take second and third place respectively in year 5 Anglais, followed by emphasis upon development of spoken English, vocabulary and a desire to read. Broadly speaking, other important aims are attitudinal: developing respect and tolerance for diverse opinions and ideas, exploring human experience through literature and, for 4A and year 5 English, developing an appreciation of literature.

It is enlightening to examine the percentage of teachers who placed a great deal of emphasis on reading. More year 5 English teachers (55 percent) claimed to place great emphasis on discrimination in reading than 4G (43 percent) or 4A (41 percent) teachers. About 30 percent of all English and Anglais teachers stated that they placed great emphasis upon the improvement of student's reading ability: 39 percent of 4G teachers emphasized this. The percentages of teachers placing a great deal of emphasis on developing student's desire to read ranged from

TABLE 3.7

SECONDARY SCHOOL ENGLISH/ANGLAIS
TEACHERS' EMPHASIS ON GENERAL AIMS

Aims[a]	4G		4A		5		5 Anglais	
	WM[b]	R[c]	WM	R	WM	R	WM	R
Explore the universal elements in human experience through the study of literature	2.5	3	2.5	5	2.8	1	2.5	8
Develop student's ability to listen effectively	2.0	14	1.8	16	1.8	17	2.3	10
Develop sense of self-worth and confidence	2.1	8	1.9	14	1.9	15		
Cultivate student's discrimination in reading	2.1	8	2.3	8	2.5	7		
Develop respect and tolerance for diverse opinions and ideas; encourage a broader perspective	2.8	1	2.5	5	2.6	6		
Promote fluent and grammatically acceptable spoken English	2.2	7	2.1	12	2.3	11	2.7	3
Develop appreciation of the historical development of English literature	.5	20	1.4	19	1.8	17	1.9	13
Develop students's ability to organize and integrate ideas and materials	2.5	3	2.9	1	2.8	1	2.7	3
Develop discipline to initiate a piece of work and complete it in a given time	2.1	8	2.2	10	2.4	8	2.4	9
Develop an attitude of enquiry	2.0	14	2.3	8	2.4	8		

[a] Anglais teachers had a slightly different list of aims from that of the 4G, 4A and 5 English teachers.

[b] WM=weighted mean. Each category was assigned a weighting: 0-not at all; 1-to a small extent; 2-to a moderate extent; 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[c] R=rank. Factors were ranked on the basis of weighted means.

TABLE 3.7 (Cont'd)

SECONDARY SCHOOL ENGLISH/ANGLAIS
TEACHERS' EMPHASIS ON GENERAL AIMS

Aims	4G		4A		5		5 Anglais	
	WM	R	WM	R	WM	R	WM	R
Promote fluent and grammatically acceptable written English	2.6	2	2.9	1	2.8	1	2.9	1
Improve student's understanding of the characteristics of the language	1.3	17	1.9	14	2.0	14		
Improve student's reading ability	2.1	8	2.0	13	1.9	15	2.1	11
Develop student's desire to read	2.4	5	2.2	10	2.2	12	2.6	5
Develop awareness of the literary and cultural heritage of the English language	.8	19	1.8	16	2.1	13		
Enrich the student's spoken and written vocabulary	2.1	8	2.4	7	2.4	8	2.6	5
Develop student's creative potential	1.5	16	1.8	16	1.8	17		
Develop an appreciation of literature	2.1	8	2.7	3	2.7	5		
Develop an appreciation of media other than literature (e.g., film, television)	1.2	18	1.2	20	1.1	20	1.2	17
Develop student's ability to think critically	2.4	5	2.7	3	2.8	1	2.8	2
Other	.2	21	.4	21	.2	21		
<u>Anglais only</u>								
Develop an appreciation of literature written and/or translated in the English language							2.6	5
Develop an appreciation of Canadian literature							1.7	14
Promote an understanding of the ways language can be used in a variety of social contexts							1.6	15

TABLE 3.7 (Cont'd)

SECONDARY SCHOOL ENGLISH/ANGLAIS
TEACHERS' EMPHASIS ON GENERAL AIMS

Aims	4G		4A		5		5 Anglais	
	WM	R	WM	R	WM	R	WM	R
Develop an understanding of different linguistic interpretations that can result from differences in the English and French languages							1.3	16
Develop creative writing ability							2.0	12

35 percent of the 4A teachers to 64 percent of the Anglais teachers. Some teachers commented that since improving students' ability was more the responsibility of teachers in earlier grades and since contact time had been reduced over the years, senior English teachers were forced to concentrate on other priorities -- for example, writing and literature study. One 4A teacher commented: "The reduction of time for my subject over the past decade has forced me to drop many minor aspects of English. Perhaps, in reaction, one tends to oversimplify. I see my function in terms of teaching young people to read well and to write well. The changed philosophy of education has already focussed on their social and verbal development. Obviously, within the expression 'to read well' one includes the broad study of literature."

To develop ability to listen is an aim which year 5 Anglais teachers emphasized, at least to a moderate degree. It is not an aim that bears a great deal of importance in the English courses (less than a quarter claimed to emphasize it greatly) but more 4G teachers (77 percent) emphasized it, at least moderately, than 4A and year 5 teachers (68 percent).

Most of those aims which one might classify as related to attitudes and self-development were stressed to a moderate or high degree: "develop respect and tolerance" was emphasized as such by over 92 percent of English teachers in all three courses; "develop discipline to initiate a piece of work" by over 80 percent of English and Anglais teachers; "develop an attitude of enquiry" by over 90 percent of the 4A and year 5 teachers (77 percent 4G); and, "develop ability to think critically" by over 92 percent of English and Anglais teachers.

Teachers are reputedly quite concerned about the poor self-concept of many of the general level students--often owing to their failure or borderline success in many courses. One would therefore expect that developing students' sense of self-worth and confidence would be considered a high priority by general level English teachers; but, although a greater number of the 4G teachers (35 percent) than those of 4A (22 percent) and 5 year courses (20 percent) gave this aim a great deal of emphasis, the weighted mean is not very high.

The responses of teachers to the aims section of the questionnaire do tend to reflect their ratings, to follow subsequently, of student competence in specific objectives and their reports of allotted instructional time. In the analysis of these data, we will frequently refer back to the emphasis teachers claimed to give to certain aims.

2. *THE OBJECTIVES OF THE COURSE*

a) *Course Content*

A list of 44 specific objectives designed to cover as completely as possible the content of senior secondary school English and first year college and university courses was presented to respondents. The information we sought was concerned with the content of the courses surveyed, the degree of consistency of coverage, and teachers' ratings of students' level of competence both at entry into the course and at exit from it.

The analysis of the results is subject to certain caveats. First, the development of English skills is an individual phenomenon. Language teaching is a spiralling, remediation process: each student is led to improve his special level of competence. Secondly, skill development occurs on a continuum and it is difficult to identify the exact level of a skill. Thirdly, at the senior Fnglish level it is virtually impossible in terms of time allocation to separate language skill development from literature study - nor, indeed, do the guidelines suggest they be separated; quite the contrary.

> The study of English should be thought of as an integrated process, with attention directed to all aspects and effects of a work, that is to reading, speaking, writing and language study rather than to any of these in isolation. Curriculum S4(13), English, Grade 13, (p.2).

Let us first examine how teachers assessed the average level of competence of their students on the following rating scale from 1 to 7.

0	1	2	3	4	5	6	7
No Competence	Minimal Competence		Moderate Competence		Competence in Varied Situations, Some Originality		Mastery Competence in High Level, Creative Situations

The teachers were asked to deal with both the actual average level of students' competence at entry and the exit level of competence they perceived their students to possess.

We assumed that a teacher treated an objective if she/he claimed her/his students had gained at least one point on the rating scale by the time they completed the course. The objectives themselves fall into 8 main groups or clusters. Tables 3.8 and 3.9 summarize the information we obtained about coverage of clusters of objectives in the surveyed courses.

In these tables it can be seen that most of the objectives in the questionnaire were included in the courses of over 60 percent of all the English teachers (For a complete list of the objectives, see Table 10). It might be mentioned here that since no respondents added extra objectives in the space provided on the questionnaire, it seems that the list of objectives allowed secondary school teachers to adequately describe their course.

Literature: More than 85 percent of the year 5 teachers treated all 9 literature objectives and over 90 percent of the year 4A teachers treated 8 of them (76 percent of the 4G teachers included 6 of the 9 objectives in their courses). The literature components of year 5 Anglais courses consisted of only three objectives and those were taught by 64 percent of the teachers.

Comprehension and Analysis: The three objectives under this heading were stressed by more than 84 percent of the 4A and 5 English teachers and by a lesser percentage of teachers at the 4G level (about 70-80 percent). In the Anglais courses, 86 percent of the teachers taught comprehension and 79 percent "distinction between essential and nonessential information."

Reading: Since the objective, "drawing inferences and seeing implications" was also included in the Project II questionnaire, it is interesting to compare results here. The application of inferential skills was considered important in the Project III questionnaire by an average of 92 percent of the teachers from 4A and year 5. In the Project II question, an average of 89 percent of the teachers (in total, 115 respondents from 4A and 136 respondents from year 5) gave the same objective heavy to moderately heavy emphasis.

TABLE 3.8

SECONDARY SCHOOL ENGLISH
COVERAGE OF THE OBJECTIVES OF THE COURSE

TOPIC	% Range of Teachers														
	Year 4 G					Year 4 A					Year 5				
	81-100%	61-80%	41-60%	20-40%	<20%	81-100%	61-80%	41-60%	20-40%	<20%	81-100%	61-80%	41-60%	20-40%	<20%
Literature (9)[a]		6[b]	3			8	1				9				
Comprehension/ Analysis (3)		3				3					3				
Reading (2)		1	1			1	1				1	1			
Writing (18)	4	8	3	3		10	3	3	1	1	11	2	2	3	
Oral Work (6)		5	1			4	1	1			2	3	1		
Language Study (2)		1		1			1	1			1	1			
Research Techniques (2)			2			2					2				
Media other than Literature (2)			1	1				1	1				1	1	

[a] No. of subtopics given in parentheses

[b] No. of subtopics within each % range

TABLE 3.9

SECONDARY SCHOOL ANGLAIS YEAR 5
COVERAGE OF THE OBJECTIVES OF THE COURSE

Topic[a]	% Range of Teachers				
	81-100%	61-80%	41-60%	20-40%	< 20%
Literature (3)[b]		3			
Comprehension/ Analysis (2)	1[c]	1			
Reading (2)		2			
Writing (14)	3	8	1	2	
Oral Work (7)	1	4	2		
Language Study (3)		3			
Media other than Literature (13)		2	4	7	

[a]The items on the Anglais questionnaire differed somewhat from those on the English questionnaire.

[b]No. of subtopics given in parentheses.

[c]No. of subtopics within each % range.

Responding to the Project III question, 78 percent of the 4G teachers included this objective in their courses, whereas in the Project II question 94 percent claimed to give it heavy to moderately heavy emphasis (these somewhat anomalous data are discussed in more detail in the Interproject analysis).

About 64 percent of the English and 68 percent of the Anglais teachers claimed to give attention to the application of flexibility in reading speed appropriate to content and purpose.

Writing. The very practical aspects of writing were taught by a large majority of the 4G, 4A, and 5 teachers. Over 80 percent of these teachers claimed to have taught such objectives as supporting generalizations with evidence, supporting an argument effectively and writing effective sentences, paragraphs and essays. Similar results appear for year 5 Anglais, except that only 64 percent of the Anglais Teachers taught effective paragraph writing.

Let us look for a moment at essay writing. In Project II the teachers were asked, "How much emphasis do you give in your teaching to the development of student competence in this mode of writing?" Claiming to give moderately heavy to heavy emphasis were 97 percent of the 4A, 90 percent of the year 5, and 78 percent of the 4G teachers. We know that most 4A, year 5 and 4G teachers claimed to place moderate to heavy emphasis on the Project III general aim, "promote fluent and grammatically appropriate written English." In answer to the specific query about essay writing 96 percent of the 4A teachers, 98 percent of the year 5 teachers and 80 percent of the 4G teachers professed to teach it. The data from both questionnaires seem to be quite consistent.

The writing of particular forms, such as memos, letters, reports or editorials, was taught generally by less than 60 percent, although 4A teachers gave slightly greater consideration to instruction in précis, summary and abstract writing. Year 4 Anglais results are generally consistent with this finding. Anglais teachers, however, placed greater stress on writing summaries, (86 percent) and reports (71 percent). The structure and style of writing was naturally very significant to teachers in 4A and 5 (over 88 percent teach it) but was of less importance to the teachers of 4G (about 70 percent). The findings for year 5 Anglais are only slightly higher than 4G (75 percent).

There were two items on the English questionnaire which referred to creative writing. One was general: demonstrate facility in planning, organization, presentation and editing of creative writing (personal essays, descriptions, poems, short stories, etc.). The other more specifically related to the use of imaginative language in prose and poetry. About 60 percent of the English (4G, 4A and 5) teachers indicated that they were concerned in their teaching with the first item. The breakdown of data in the second item is more revealing; both 4A and 5 teachers placed a far greater emphasis on using language imaginatively in writing prose (about 85 percent) than on using it for poetry (55 percent). In 4G courses, the emphasis on imaginative writing was less (39 percent). Anglais patterns differed: 71 percent of 5 Anglais teachers (10) taught poetry and only 50 percent (7) taught prose.

Oral Work: Over 78 percent of the 4A and 5 year teachers covered 5 of the 6 objectives here; 70 percent of 4G teachers taught 5 of them. There is one exception: 4A and 4G teachers paid less attention than year 5 teachers to small group discussion. Only about 45 percent in all 3 courses appear to have stressed participation in a dramatic performance.

In Anglais, there were 7 objectives related to oral work. A very high percentage of teachers - 86 percent or 12 teachers dealt with presentation of an oral summary. About 65 percent of Anglais teachers, in all, taught 5 of the 7 oral topics.

Language Study: About 82 percent of 4A and year 5 teachers claimed to stress grammatical analysis, and about 60 percent linguistics analysis. Both these areas were again of less importance to 4G instruction (69 percent and 39 percent, respectively). All 3 Anglais objectives were treated by 64 percent (9) of the teachers.

Research Techniques: Research techniques were stressed by a major portion of 4A and year 5 teachers (over 86 percent), but were not considered relevant by almost half of the teachers of 4G students (most of whom are not university-bound).

Media: Media other than literature appeared to be less important in the English courses. About half of these teachers asked their students to critically assess film, television, magazines, newspapers, etc. and only 20 percent of them were concerned with mass media production.

There were 13 objectives in this category in Anglais. Sixty-four percent of the teachers stated that their students contributed to the presentation of a play and an oral interview. However, 7 of the 13 objectives were stressed by only 20-40 percent of the teachers.

b) English Teachers' Perceptions of Actual Average Level of Student Competence at Entry and Exit

In Table 3.10, we have reported the percentage of respondents teaching each topic. This figure was obtained from entry-exit ratings of the objectives. Where the exit level exceeded the entry level, it was assumed that the objective was taught. Many teachers, however, rated the average level of students' competence even though they did not appear to teach the particular objective (i.e., the entry-exit levels they reported were identical). We have also reported this information in Table 3.10. It was significant to note the average level of competence of students in a skill for which their exit level was not advanced from their entry level but to which teachers assigned a rating. An explanation for the lack of difference between entry and exit levels is that teachers assume a level of competence in some skills on which others are based. Also, they may attempt to maintain certain skill competence through review.*

The data for competence at entry and exit level are based on ratings by all teachers who rated competence in skills whether or not objectives were treated in the course.

The problem of rating average level of students' competence at entry and exit is of course complicated by the perceived variability of entering students' ability (earlier documented) and by the fact that ratings had to be very subjective, especially for objectives which were stated more precisely on the questionnaire than they were in reality considered in the English classroom. We have assumed that an objective is considered important if teachers teach with some reference to it, but since time breakdowns (amount of time spent teaching topics) are made for very broad English areas only, we do not have a precise, independent measure of the importance of objectives in terms of class time. Some teachers chose to respond to the objective in terms of their emphasis rather than the competence level of students. Said one - a 4A assistant department head with 10 years' experience:

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*To the question on the Anglais questionnaire regarding the amount of time spent in review, one teacher claimed he spent 75 percent of the class time in review and six teachers between 10 and 25 percent. Five teachers spent no time on review. (One did not answer.)

TABLE 3.10

SECONDARY SCHOOL ENGLISH
AVERAGE LEVEL OF STUDENTS' COMPETENCE
AT ENTRY AND EXIT

Topic	Year 4G						Year 4A						Year 5					
	% Teaching[a]	% Rating[b]	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
Literature																		
1. Analyze literature through an examination of its characteristics	76	88	1.8	1.0	3.2	1.2	94	98	2.3	1.2	3.8	1.3	96	98	2.7	.8	4.3	1.0
2. Analyze literature in terms of the relationship of organization to meaning	71	82	1.5	.9	2.8	1.0	90	94	1.8	1.2	3.3	1.3	92	94	2.2	1.0	3.9	1.1
3. Identify literary genres by examination of their characteristics	53	78	1.5	.9	2.5	1.0	90	96	2.0	1.3	3.4	1.4	86	96	2.8	1.3	4.3	1.4
4. Write a literary critique	61	78	1.2	.9	2.4	1.1	90	98	1.7	1.1	3.5	1.4	100	100	2.0	1.2	3.9	1.2
5. Apply a critical vocabulary in the evaluation of the range, nature and quality of a particular work	61	80	1.1	.8	2.1	1.0	96	98	1.7	1.0	3.2	1.2	98	98	1.9	1.1	3.7	1.2
6. Explain the relationship between the text and extrinsic materials (e.g., biographical, historical, mythological)	51	69	1.2	.8	2.2	1.2	90	96	1.6	1.2	3.0	1.3	92	94	1.7	.9	3.4	1.0

[a] Percentage of teachers teaching topic
[b] Percentage of teachers who indicated a student competence level
[c] Original ordering of questionnaire items has been changed to facilitate presentation

TABLE 3.10 (cont'd)

SECONDARY SCHOOL ENGLISH
AVERAGE LEVEL OF STUDENTS' COMPETENCE
AT ENTRY AND EXIT

Topic	Year 4G						Year 4A						Year 5					
	% Teaching	% Rating	Entry		Exit		% Teaching	% Rating	Entry		Exit		% Teaching	% Rating	Entry		Exit	
			$\bar{X}$	SD	$\bar{X}$	SD			$\bar{X}$	SD	$\bar{X}$	SD			$\bar{X}$	SD	$\bar{X}$	SD
7. Analyze literary forms in terms of: stylistic techniques (e.g., style, tone, form)	61	82	1.3	.7	2.4	1.0	96	100	1.8	1.2	3.4	1.3	96	98	2.1	1.1	3.7	1.1
8. Analyze literary forms in terms of connotation (e.g., word, image, sound)	65	84	1.5	.8	2.5	1.2	92	100	1.9	1.2	3.4	1.4	96	98	2.3	1.1	4.0	1.0
9. Evaluate written and oral critiques	59	73	1.2	.9	2.3	1.1	76	84	1.5	1.1	3.1	1.5	90	92	2.2	1.0	3.7	1.2
<u>Media Other Than Literature</u>																		
1. Critically assess film, television, magazines, newspapers, etc.	55	71	1.6	1.1	3.1	1.2	59	69	1.9	1.1	3.3	1.3	49	53	2.1	1.2	3.4	1.3
2. Present a mass media production	22	41	.9	1.1	2.0	1.9	18	41	.9	1.2	1.6	1.6	20	31	1.8	1.4	2.9	1.7
<u>Comprehension/Analysis</u>																		
1. Comprehend a variety of materials (essential meaning and significant details)	69	92	2.5	.9	3.5	1.0	86	100	2.9	.9	4.2	1.0	94	94	2.7	.9	4.3	1.0
2. Understand the subtler nuances of language (e.g., emotional connotation of words, imaginative effects	73	94	1.5	1.1	2.7	1.3	92	100	2.0	1.0	3.5	1.2	98	100	2.3	1.0	3.9	1.1

TABLE 3.10 (cont'd)

SECONDARY SCHOOL ENGLISH
AVERAGE LEVEL OF STUDENTS' COMPETENCE
AT ENTRY AND EXIT

Topic	Year 4G						Year 4A						Year 5					
	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
3. Distinguish between essential and non-essential information	80	94	2.1	.8	3,3	1.1	84	100	2.5	1.1	3.9	1.2	94	98	2.7	1.1	4.3	1.1
Reading																		
1. Apply inferential skills	78	92	1.5	.8	2.8	1.2	83	94	2.0	1.0	3.5	1.0	96	98	2.1	1.1	3.9	1.2
2. Apply flexibility in the speed of reading appropriate to content and purpose	59	86	1.6	.9	2.5	1.0	67	82	2.0	1.2	3.3	1.3	65	80	2.5	1.1	3.7	1.1
Writing																		
1. Support generalizations with appropriate evidence	84	94	2.0	1.0	3.5	1.1	96	100	2.4	1.1	4.3	1.2	94	100	2.7	1.1	4.4	1.1
2. Write an effective sentence	82	94	2.4	1.0	3.6	1.0	90	100	2.8	1.2	4.2	1.2	96	100	3.0	1.1	4.6	1.1
3. Write an effective paragraph	82	94	2.0	1.1	3.5	1.1	90	100	2.5	1.1	4.1	1.2	100	100	2.8	1.1	4.6	1.0
Demonstrate facility in writing in terms of planning, organization, presentation and editing:																		
4. Essays (expository prose)	80	88	1.7	.8	3.2	.9	96	100	2.3	1.2	4.0	1.2	98	100	2.8	1.1	4.5	1.0
5. Creative writing (personal essays, descriptions, poems, short stories)	61	80	1.7	1.1	2.8	1.5	63	90	2.8	1.3	3.8	1.3	65	76	2.8	1.3	4.0	1.2

TABLE 3.10 (cont'd)

SECONDARY SCHOOL ENGLISH
AVERAGE LEVEL OF STUDENTS' COMPETENCE
AT ENTRY AND EXIT

Topic	Year 4G						Year 4A						Year 5					
	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
6. Précis, summary and Abstract	51	73	1.4	1.0	2.4	1.2	76	84	1.8	1.2	3.4	1.4	73	80	2.3	1.4	3.9	1.0
7. Memos	20	35	1.4	1.6	2.2	1.9	14	39	1.5	1.8	1.9	1.9	20	29	1.7	1.5	2.5	1.9
8. Letters	51	65	2.0	1.2	3.3	1.4	25	47	1.8	1.4	2.5	1.7	24	37	2.4	1.5	3.3	1.9
9. Reports	63	73	1.8	1.1	3.3	1.3	59	69	2.1	1.1	3.5	1.5	53	63	2.6	1.0	3.9	1.3
10. Editorials	39	49	1.5	1.0	2.8	1.5	43	59	1.4	1.2	2.6	1.5	35	43	2.5	1.3	3.9	1.3
In written work:																		
11. Use language in a grammatically appropriate manner	71	94	2.2	.9	3.3	1.0	92	100	2.5	1.0	3.8	1.0	88	100	3.0	1.1	4.3	1.0
12. Use words with precision	76	92	1.8	.9	3.0	.9	94	100	2.1	1.0	3.6	1.0	98	98	2.4	1.0	4.0	1.1
13. Use words with subtlety	65	92	1.1	.8	2.1	1.1	88	98	1.7	1.1	3.0	1.2	96	98	1.9	1.0	3.5	1.1
14. Write in a style appropriate to content and audience	73	94	1.7	1.0	2.7	1.2	84	98	2.0	1.1	3.4	1.1	90	94	2.6	1.0	4.1	1.2
Use language imaginatively in writing:																		
15. Poetry	39	63	1.2	.9	2.1	1.3	59	80	2.1	1.4	3.1	1.5	41	53	1.9	1.2	3.2	1.6
16. Prose	55	88	1.7	.8	2.7	1.2	82	96	2.3	1.2	3.6	1.3	86	94	2.6	1.0	4.1	1.2

TABLE 3.10 (cont'd)

SECONDARY SCHOOL ENGLISH
AVERAGE LEVEL OF STUDENTS' COMPETENCE
AT ENTRY AND EXIT

Topic	Year 4G						Year 4A						Year 5					
	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
17. Present an argument effectively	80	94	1.8	.9	3.2	1.0	94	100	2.2	1.0	3.7	1.1	92	96	2.7	1.0	4.2	1.1
18. Use effective note-taking techniques	69	90	1.8	1.0	3.0	1.1	75	94	2.2	1.3	3.4	1.4	80	86	2.3	1.1	4.0	1.1
Research																		
Use research techniques effectively:																		
1. Use library efficiently (indexes, reference materials)	55	88	1.7	1.0	2.7	1.3	86	100	2.2	1.2	3.7	1.3	86	96	2.9	1.0	4.5	1.1
2. Use appropriate conventions related to acknowledging references (e.g., footnotes, bibliography)	57	82	1.1	1.3	1.9	1.2	88	98	1.8	1.3	3.6	1.4	90	98	2.4	1.2	4.4	1.2
Oral Work																		
1. Speak in a style appropriate to audience and subject matter	67	88	1.9	1.0	3.1	1.1	80	92	2.3	1.1	3.5	1.1	78	90	2.5	1.1	3.8	1.2
2. Use words with precision	76	92	1.6	.8	2.8	.9	90	98	2.0	1.0	3.3	1.1	88	94	2.3	1.0	3.7	1.2
3. Use words with subtlety	69	92	1.0	.7	2.0	1.0	86	96	1.7	1.1	2.9	1.2	78	90	2.0	1.1	3.3	1.3
4. Present an argument effectively	78	90	2.0	.9	3.3	1.0	86	96	2.2	1.0	3.6	1.2	84	92	2.6	1.0	4.0	1.1

TABLE 3.10 (cont'd)

SECONDARY SCHOOL ENGLISH
AVERAGE LEVEL OF STUDENTS' COMPETENCE
AT ENTRY AND EXIT

Topic	Year 4G						Year 4A						Year 5					
	%	%	Entry		Exit		%	%	Entry		Exit		%	%	Entry		Exit	
	Teaching	Rating	$\bar{X}$	SD	$\bar{X}$	SD	Teaching	Rating	$\bar{X}$	SD	$\bar{X}$	SD	Teaching	Rating	$\bar{X}$	SD	$\bar{X}$	SD
5. Contribute effectively in a small group discussion	65	88	2.3	1.2	3.5	1.3	65	96	2.6	1.3	3.7	1.4	78	90	2.9	1.1	4.4	1.2
6. Participate in a dramatic performance	43	71	1.7	1.3	2.6	1.8	41	73	1.9	1.2	2.9	1.6	47	55	1.9	1.1	3.4	1.6
Language Study																		
Analyze language in terms of:																		
1. Grammar	69	82	1.0	.7	2.0	1.1	80	100	1.6	1.1	2.8	1.2	84	96	1.8	1.1	3.1	1.0
2. Linguistics (origin and characteristics)	39	73	.5	.7	1.1	1.2	55	86	.6	.9	1.6	1.5	65	84	1.0	1.0	2.3	1.2

> A low score in column 1 (entry level) implies a criticism of a colleague and a high rating in column 2 (exit) implies a certain amount of conceit. Therefore I have tried to answer the questions not so much on the basis of what skills the students have but on the basis of what importance I give to the skills mentioned, i.e., I consider #4 very important and teach it well (exit rating = 7) and consider #10b less important and as a result give it little emphasis (entry & exit ratings = 2).

Moreover, not all teachers considered their course representative of the courses taken by students at their particular level: one teacher explained that he was describing his share of a team-taught course and another 4A teacher described his two-thirds credit literature course which followed a language skills development credit in the first term.

We must issue a note of caution when considering these data. The ratings of student competence are perceptions of the teachers and do not necessarily reflect the actual achievement of students in these courses.

In this discussion about the data in Tables 3.10 and 3.11, we will select one or two objectives from the various clusters, using two principal criteria: (1) the objective was considered important in that a large number of teachers taught and/or rated the topic: (2) the entry and exit rating difference was fairly typical for other equally important objectives.

In literature, a majority of the 4G, 4A and year 5 teachers, ranging from 76-96 percent, taught the analysis of literature through an examination of its characteristics. Students' competence at entry was generally rated quite low by all teachers--average entry means ranged from 1.8 in 4G to 2.7 in Year 5. In general, teachers claimed that they could expect a competence rating of between 1.4 and 1.6 points higher at exit that the rating they estimated at entry, but it is noteworthy that, even at exit from each level, teachers claimed that their students were still only moderately competent: the highest average mean rating was 4.3 in year 5 courses. Again, we must point out the wide spread of scores (S.D.=1.0 to 1.3).

In the comprehension/analysis cluster, we note that the objective "distinguish between essential and non-essential information" was important; 80-94 percent taught it, and close to 100 percent rated it. On the average, the difference in entry and exit ratings by 4G; and year 5 teachers was approximately 1.4 as measured by the rating scale.

In reading, the entry levels of competence estimated by the high percentage of teachers who taught inferential skills (78 percent of 4G to 96 percent of year 5) were rated quite low (1.5 in 4G, 2.0 in 4A and 2.1 in year 5). Mean exit levels of competence were again estimated approximately 1.5 higher; but the individual ratings of the average level ranged from "moderately competent" to "competence demonstrated in varied situations".

In writing, a majority of English teachers rated the items "write an effective sentence" and "write an effective paragraph" (82 percent of 4G teachers, 90 percent of 4A, and 96/100 percent of year 5 teachers taught them). They rated students' exit level as generally close to moderately competent (3.5-4.6). However, the variance of ratings is great. The overall improvement from entry to exit in all courses ranged from 1.2 to 1.8 points as measured by the rating scale. We should note that teachers of each of the three courses rated levels in these two particular objectives higher than exit levels rated for other objectives (the year 5 exit level 4.6 is the highest average exit rating of all).

In oral work, 90-98 percent of the teachers rated "use words with precision" and "present an argument effectively." The difference between entry and exit levels of competence ranged from 1.2 to 1.4, the highest average at exit representing above "moderate competence". The highest exit level recorded was that of a year 5 teacher who rated "present an argument effectively" at 5.1, i.e. "competence with some originality."

In language study, analysis of language in terms of grammar was taught by 69-84 percent of the English teachers. Entry levels were generally low (1.0 in 4G, 1.6 in 4A and 1.1 in year 5), yet exit levels were not very high (2.0 4G, 2.8 4A, 3.1 year 5).

The average ratings in all English courses imply that the development of moderate competence in objectives is the goal for most teachers.

The average gain in ratings from entry level to exit level ranged from 1.0 to 2.0 points as measured by the rating scale.

Bearing in mind that there were only 14 Anglais courses surveyed, we will note only outstanding objectives taught by over 50 percent of the teachers.

Anglais teachers generally indicated a very low to low competence at entry in such objectives. The highest entry rating given any objective was 2.0 for "contribute effectively in a small group discussion".

TABLE 3.11

SECONDARY SCHOOL ANGLAIS YEAR 5
AVERAGE LEVEL OF STUDENTS' COMPETENCE
AT ENTRY AND EXIT (N=14)

Topic	% Teaching[a]	% Rating[b]	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
Language Skills						
In reading:						
1. Comprehend the meaning of a passage	86	100	1.9	.5	2.8	.5
2. Distinguish between essential and non-essential information	79	100	1.6	.7	2.6	.5
3. Apply flexibility in the speed of reading appropriate to content and purpose	71	92	1.2	.8	2.1	.7
4. Apply inferential skills	64	92	1.4	.9	2.2	.8
In writing:						
5. Write an effective summary of materials read	93	100	1.9	.9	2.9	.7
6. Demonstrate facility in writing in terms of planning, organization, presentation and editing:						
a) expository writing	79	100	1.7	.6	2.5	.8
b) persuasive or argumentative essay	86	100	1.5	.6	2.5	.8
c) business letter	36	36	1.2	.8	2.2	.8
d) personal letter	21	21	2.2	.4	2.8	.4
e) report	71	71	1.6	.5	2.6	.5
f) summary	86	86	1.9	.2	2.9	.3
7. Demonstrate facility in imaginative, creative writing:						
a) prose	71	71	1.6	.7	2.8	.6
b) Poetry	50	64	1.0	.7	1.8	.6

[a] Percentage of teachers teaching topic

[b] Percentage of teachers who indicated a student competence level

TABLE 3.11 (Cont'd)

SECONDARY SCHOOL ANGLAIS YEAR 5
AVERAGE LEVEL OF STUDENTS' COMPETENCE
AT ENTRY AND EXIT (N=14)

Topic	% Teaching	% Rating	ENTRY $\bar{X}$	ENTRY SD	EXIT $\bar{X}$	EXIT SD
8. Apply appropriate structure, grammar, and conventions of written English.	71	100	1.7	.6	2.5	.5
9. Use correct spelling.	79	100	1.6	.6	2.6	.5
10. Demonstrate effective organization in the writing of a paragraph.	64	100	1.9	.7	2.8	.6
11. Present an argument effectively.	64	92	1.6	.7	2.4	.5
12. Use effective note-taking techniques.	64	92	1.5	.9	2.3	.8
In speaking:						
13. Present an oral summary of a speech, story or report.	86	92	2.0	.6	3.0	.7
14. Speak in a style appropriate to subject matter and audience.	71	92	1.8	1.0	2.6	.9
15. Present the following effectively:						
a) an argument, formal debate	64	71	1.1	.7	2.2	.4
b) a story to amuse or entertain	64	71	1.6	.5	2.6	.7
c) a formal speech (e.g. in public speaking)	50	57	1.4	.5	2.4	.9
16. Contribute effectively in a small group discussion.	71	92	2.0	.4	2.8	.4
17. Use language appropriately in a variety of social contexts.	57	78	1.6	.8	2.4	.7
Language Study						
1. Analyze language in terms of grammar.	64	78	1.0	.6	2.6	.8
2. Apply appropriate terminology in analysis of language.	64	71	.8	.8	2.0	.9
3. Analyze problems arising from French and English language differences (idioms, imagery, etc.)	64	71	1.4	.8	2.5	.7

TABLE 3.11 (Cont'd)

SECONDARY SCHOOL ANGLAIS YEAR 5
AVERAGE LEVEL OF STUDENTS' COMPETENCE
AT ENTRY AND EXIT (N=14)

Topic	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
Literature						
1. Apply a critical vocabulary in the evaluation of the range, nature and quality of a particular work.	79	100	1.4	.6	2.4	.8
2. Analyze literary forms in terms of:						
a) stylistic techniques (e.g. plot, style, characterization)	79	92	1.5	.9	2.6	.9
b) connotation (e.g. word image, sound)	64	92	1.1	1.0	2.1	1.0
Media Other Than Literature						
1. Critically assess						
a) film	50	57	1.8	1.0	2.9	.8
b) magazines	43	42	1.5	.5	2.9	.8
c) newspapers	43	50	1.6	.5	2.7	.8
d) television/radio	29	35	2.0	1.2	3.2	.8
e) drama	43	64	1.6	.5	2.7	.9
2. Critically assess advertising in terms of:						
a) language used	29	28	.8	.5	2.0	.8
b) design and presentation (oral and/or written)	21	28	1.0	.8	2.0	.8

TABLE 3.11 (Cont'd)

SECONDARY SCHOOL ANGLAIS YEAR 5
AVERAGE LEVEL OF STUDENTS' COMPETENCE
AT ENTRY AND EXIT (N=14)

Topic	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
3. Critically assess the language of politics (e.g., political speeches, editorials) in terms of:						
a) language used	21	42	1.0	.9	1.8	.6
b) design and presentation	29	42	.8	.8	1.8	.8
4. Contribute to the presentation of:						
a) a film	29	28	.8	1.0	2.5	1.3
b) a videotape or radio presentation	36	35	.8	.9	2.6	1.1
c) a play	64	71	1.7	1.1	2.9	.9
d) an oral interview	64	64	1.4	.5	2.8	.7

Teachers were also consistently quite low in their ratings of students at exit: The highest exit rating assigned was 3.0 for "present an oral summary".

In reading, as one would expect, comprehension was considered very important-12 out of 14 taught it, 14 rated it. There was a difference of 1.9 between entry and exit level of competence. Exit level was not very high (2.8, which is less than moderately competent) and yet this was the highest rating of the four reading skills.

In writing, "persuasive or argumentative essay" and "summary" were both taught by 12 teachers. Again, the expectation at exit was not very high (2.5 and 2.9 respectively).

The 12 teachers who taught "present an oral summary of a speech, story or report" indicated an average improvement of 1.0 on the rating scale. The variance of ratings (SD=.6 and .7) shows that teachers did not describe their students' ability much beyond moderate competence.

Language study objectives were not taught intensively; only 9 teachers claimed they treated them.

In literature, 11 teachers taught "critical evaluation" and "stylistic techniques"; they declared that by the end of the course their students had improved by 1.0 and 1.1 points, respectively.

These ratings of average level of competence of students reflect teacher perceptions only. The ratings of some objectives do, however, provide a useful point of comparison with the objective testing of student achievement that was the focus in Project II.

(c) General Organization of the Course Including Time Allocations

We now have some idea of both the general emphases and specific objectives that are given attention by teachers of English and Anglais. It is important, then, to examine the way in which they report the organization of their course content, in terms both of class time spent and of general approach to literature.

Respondents were asked to estimate the percentage of course time devoted to formal instruction in 3 topic areas: literature, media other than literature and language skills. Formal instruction time was broadly

interpreted as class time or student-teacher contact time. Since in most courses, language/composition is taught within a literature context, respondents experienced some difficulty in allocating percentages of course time. The results for year 4 and year 5 English courses are reported in Table 3.12; for Anglais, in Table 3.13.

The majority of year 4 teachers (53 percent 4G, 73 percent 4A) claimed they spent over 40 percent of instruction time on literature. The difference in emphasis between the two groups that this reflects is corroborated by course descriptions in the 1975/6 school calendars. Also, interviews with department heads showed that 4A is considered to be the course for more academically inclined students, many of whom plan to continue their education at university.

Reading is a skill that teachers consider to have been developed in earlier grades; it was not dealt with by 23 percent of the 4A teachers and was given only up to 5 percent of the time by a quarter (26 percent) of them. In a previous question teachers had mentioned that many general-level students were not highly skilled in reading, and yet the majority of 4G teachers (56 percent) devoted 10 percent or less time to the skill. Close to three-quarters of both 4G and 4A teachers gave the aim, "improve reading ability" moderate to high emphasis. (Perhaps most teachers calculated percentage of reading time on the basis of time given to reading, orally or silently, in class, rather than to formal instruction in it.)

Naturally, teachers stated that more emphasis was given to writing instruction, but again less reported class time was devoted to it than one would expect from the stress writing received as a general aim. Usually, though, students do most of their writing for homework assignments and instruction is based on the marking of those out-of-class assignments; all year 4 teachers claimed to devote less than 50 percent of class time to the development of writing skills and about half of them (4G-43 percent, 4A-51 percent) declared between 21-50 percent of class time was spent on it.

Oral expression and media were not afforded much formal instruction time in senior level courses: the majority of teachers gave them no attention or some for less than 10 percent of class time.

TABLE 3.12

SECONDARY SCHOOL ENGLISH
TIME ALLOCATION

Topic	% Ranges of Total Course Time Allocated														
	Year 4G					Year 4A					Year 5				
	0%	1-20%	21-50%	51-70%	71-100%	0%	1-20%	21-50%	51-70%	71-100%	0%	1-20%	21-50%	51-70%	71-100%
Literature	4%[a]	2%	63%	20%	11%	4%		41%	42%	13%		2%	12%	51%	35%
Media															
Critical Assessment	45	53			2	55	45				59	41			
Production	78	22				82	18				88	12			
Language Skills												25[b]	73	2	
Reading	12	70	16	2		23	71	6							
Writing	4	53	43			4	45	51							
Speaking	18	78	4			12	88								

[a] % of teachers in each category.
[b] Language skills were not itemized on the year 5 questionnaire.

TABLE 3.13

SECONDARY SCHOOL ANGLAIS YEAR 5
TIME ALLOCATION (N=14)

Topic	% Ranges of Total Course Time Allocated						
	0%	1-10%	11-20%	21-40%	41-50%	51-60%	61-100%
Literature	8%[a]	14%	14%	14%	22%	14%	14%
Media other than Literature:							
critical assessment of newspapers, magazines	71	29					
critical assessment of television and radio	71	29					
media production (videotapes, film, etc.)	64	36					
Language Skills:							
reading	36	36	21	7			
listening	43	50	7				
language study (analysis of grammar, linguistics, etc.)	21	72	7				
formal and informal speaking	21	58	21				
writing	14	28	22	22	7	7	

[a] % of teachers in each category

Literature and development of writing skills, then, were the areas in which most class time was spent at the year 4 level.

Most year 5 English teachers (86 percent) spent at least half of their class time teaching literature and a substantial number (35 percent) devoted more than 70 percent of time to it. It seems that formal instruction in the development of language skills was subordinated to literature study; most of the year 5 English teachers (92 percent) claimed they devoted less than 40 percent of the time to language skills in general (but teachers viewed language development as a concomitant of literature). Calendar course descriptions, teacher comments and interview data showed that, for the most part, language development work was dealt with on an individual basis through the marking of written literature assignments. One comment at the end of the questionnaire was, "The assignment is given 50 percent of its mark for literature content and 50 percent for style, grammar, spelling, coherence, organization, etc." Media appreciation--an aim that did not receive high attention--is also given little or no attention in terms of in-class time.

Half of the year 5 Anglais teachers (7) claimed they spent over 40 percent of their class time on literature and another 4 of them spent 10-40 percent on it. Because most of the Anglais students are already functionally bilingual, teachers mentioned that year 5 is the time to place greater stress on literature than on language skills in order to prepare students for university. Although teachers stated these students require substantial improvement in writing, their estimates of class time spent on the subject are low: 5 of the 14 teachers declared they spent more than 20 percent of the class time on writing. It is significant, too, that 6 teachers spent no time on developing listening skills and the 9 teachers who emphasized speaking skills spent less than 20 percent of the class time on it. Language study or analysis took up less than 10 percent of the time of 10 Anglais teachers. Media appreciation, again, was insignificant.

(d) Main Approaches to Literature

The teachers in all four types of courses surveyed (4G, 4A, year 5 English and year 5 Anglais) reported a variety of main approaches to the teaching of literature.

TABLE 3.14

SECONDARY SCHOOL ENGLISH/ANGLAIS
MAIN APPROACHES TAKEN IN LITERATURE STUDY

Approach	% of Teachers Responding			
	4G	4A	5	5 Anglais
Variety	46%	50%	44%	36%
Form and style	2	6	6	14
Genre	12	17	18	14
Ideas, concepts	19	6	20	
Mode		2		
Thematic	19	9	10	14
Culture	2	4		14
Historical		6	2	7

About half the English teachers (44-50 percent) declared they used a variety of approaches. Thereafter approaches differed in the different courses. Approaches by ideas and concepts or by theme were important in 4G; less so in 4A. Literature was studied by genre especially in the 4A and year 5 courses.

The Anglais teachers' responses were mainly a variety of approaches (36 percent) with the use of several other approaches evenly distributed.

A finer breakdown of time spent on literature is provided in the analysis reported in Tables 3.15 and 3.16.

The novel appears to have been the genre of primary importance in both year 4 courses, with about 87 percent of instructors spending over 20 percent of their time on it. The study of plays ranked next in importance. Twentieth-century literature occupied more than half the time spent in most of the 4G (92 percent) and 4A (72 percent) courses. Canadian literature

TABLE 3.15

SECONDARY SCHOOL ENGLISH
TIME ALLOCATED TO LITERARY GENRES AND PERIODS
AND TO NATIONAL LITERATURES

Genre/Period/Origin	% Range of Total Course Time Allocated											
	4G				4A				Year 5			
	0%	1-20%	21-50%	51-100%	0%	1-20%	21-50%	51-100%	0%	1-20%	21-50%	51-100%
Genres												
Essays	43%[a]	53%	4%		10%	86%	4%		27%	73%		
Novels	4	8	61	27%		14	84	2	4	19	69	8
Plays	12	50	36	2	2	26	70	2	4	27	65	4
Poems	18	78	4		6	68	26		6	62	30	2
Short Stories	6	80	14		16	78	6		23	77		
Other	86	14			86	12	2		86	14		
Periods												
Before 1900	37	35	26	2	4	24	51	21	6	21	50	23
20th Century	2		6	92	2	6	20	72		10	23	67
National Literatures												
Canadian	8	50	36	6	22	52	18	8	19	57	16	8
American	6	18	49	27	13	24	53	10	23	38	35	4
British	19	31	42	8	6	6	43	45	6	4	39	51
Other English speaking and literature in translation	90	9		1	79	18	3		68	30	2	

[a] % of teachers in each category

TABLE 3.16

SECONDARY SCHOOL ANGLAIS YEAR 5

TIME ALLOCATED TO LITERARY GENRES AND PERIODS AND TO NATIONAL LITERATURES

Genre/Period/Origin	% Range of Total Course Time Allocated				
	0%	1-20%	21-40%	41-50%	51-100%
Genres					
Essays	31%[a]	54%	15%		
Novels	8	8	61	23	
Plays		46	39	15	
Poems	8	84		8	
Short Stories	8	69	15	8	
Other	92	8			
Periods					
Before 1900	8	39	30		23
1900-1940	8	54	23	15	
1940-present	8	31	23		38
National Literatures					
Canadian (other than French)	31	23	23	8	15
French Canadian - translation	77	23			
American	8	46	38		8
British	15	15	15	15	38
Other English speaking and literature in translation	62	30	4	4	

[a]% of teachers in each category

was emphasized for over 20 percent of the time in fewer courses than was literature by American and British authors. In summary, the twentieth-century American or British novel appears to be the type of literature most commonly studied most of the time, in year 4 courses.

The same genres as in year 4 courses--novels and plays appear to have been stressed in the literature components of year 5 English courses. Poetry was emphasized in 65 percent of the courses, taking up between 11 and 40 percent of the time. Essays and short stories received less attention throughout. Literature before 1900 received greater attention (73 percent of courses spent over 20 percent of the time considering it), as calendar course descriptions had indicated.

Although slightly more year 5 teachers spent some time on Canadian authors (81 percent) than on American (77 percent), the number of courses that devoted over 20 percent of the time to British authors (90 percent), far outweighed those that considered American (39 percent) or Canadian (24 percent) authors for the same amount of time.

In year 5 Anglais (Table 3.16) again, novels and plays were the genres taught in most courses for over 20 percent of the time. Literature, before 1900 and literature after 1940 were emphasized in a few more courses than was early twentieth-century literature. Canadian literature appreciation was an aim of 10 (72 percent) of the Anglais teachers--9 (65 percent) declared they placed moderate or high emphasis on it--and only 6 (46 percent) of them reported spending over 20 percent of class time discussing Canadian other than French literature. French-Canadian authors received very little attention (only 3 teachers spent less than 20 percent of class time on them), and British authors received slightly more than American.

3. *TEACHING METHODS*

(a) Instructional Techniques

Teachers were asked to estimate the percentage of time which they used for various methods of instruction (Tables 3.17 and 3.18).

TABLE 3.17

SECONDARY SCHOOL ENGLISH
TEACHING METHODS

Method	% of Teachers Using for % Range of Time											
	4G				4A				5			
	0%	1-20%	21-50%	51%+	0%	1-20%	21-50%	51%+	0%	1-20%	21-50%	51%+
Lecture	35%[a]	63%	2%		9%	73%	18%		10%	78%	12%	
Socratic	4	25	52	19		22	60	18	2	18	53	27
Small Group Activities	27	65	8		15	79	6		22	72	6	
Seminar, Tutorial	57	43			26	72	2		33	59	8	
Student Presentation	35	65			35	65			45	55		
Testing	4	96			2	96	2		4	96		
Audiovisual	29	69		2	12	88			23	77		
Field Trips	78	22			69	31			63	37		
Dramatic Presentations	43	57			33	67			41	59		
Classroom Study	6	80	12	2	10	88	2		27	73		
Individualized Instruction	80	20			69	31			84	16		
Other	94	4	2		96	4			86	14		

[a] % of teachers in each category

TABLE 3.18

SECONDARY SCHOOL ANGLAIS YEAR 5
TEACHING METHODS

Method	% of Teachers Using for % Range of Time			
	0%	1-20%	21-50%	51%+
Lecture		72%[a]	21%	7%
Socratic	7%	43	35	14
Small Group Activities	36	64		
Seminar, Tutorial	36	64		
Student Presentations	29	71		
Testing		100		
Audiovisual	14	86		
Field Trips	71	29		
Dramatic Presentation	21	79		
Classroom Study	21	72	7	
Individualized Instruction	93	7		
Other	86	14		
Dictation	71	29		
Translation	100			
Language Lab	93	7		

[a]% of teachers in each category

Teachers of 4G and 4A obviously favoured the Socratic method of teaching above any of the others (96 percent and 100 percent respectively used it). It should be noted however, that some teachers did not use the Socratic method very extensively (for less than 20 percent of class time: 4G-25 percent, 4A-22 percent). while others (4G-19 percent, 4A-18 percent) spent more than half of their time using this method.

Substantial numbers of teachers at both levels devoted up to 20 percent of their time to testing and to classroom study (at least 90 percent of both groups of teachers listed these methods).

Interestingly, more 4A than 4G teachers (almost 25 percent more) used the lecture method, perhaps indicating a slightly more academic approach in the 4A classes. Thirty percent more 4A than 4G teachers devoted up to 20 percent of their time to seminar and tutorial work; and audiovisual work, field trips and dramatic presentations received attention from 9-19 percent more 4A teachers.

In year 5 English, Socratic method and lecture were the most heavily emphasized, the Socratic method being by far the most popular technique. In general the pattern of teaching methods for year 5 is very similar to that for 4A.

Year 5 Anglais teachers tended to favour the lecture method, though the Socratic technique was used more frequently.

In general, the picture across all 4 courses is one of considerable diversity, with very few methods being used more than 20 percent of time.

(b) Out-of Class Work

Teachers were asked to estimate the average out-of-class time students spent on their course assignments.

Teachers of 4G and 4A expected about half to three-quarters of an hour out of class for each in-class hour.

The majority of year 5 English teachers estimated that, on the average, their students spent at least three-quarters of an hour out of class for every hour of class time; one-third expected between one and two hours.

Anglais year 5 teachers had the most consistent set of expectations - 61 percent expected between half an hour and an hour for every hour of class time.

TABLE 3.19

SECONDARY SCHOOL ENGLISH/ANGLAIS: STUDENT OUT-OF-CLASS TIME

Out-of-class time as a percentage of class time	% of teachers in each time category			
	English			Anglais
	4G	4A	5	Year 5
0%	2	2	2	
1-25	19	37	2	
25-50	45	12	20	8
51-75	8	29	10	15
76-100	18	8	27	46
101-150	2	8	21	8
151-200	6	4	16	8
200+			2	8
N/A				8

(c) Provision for Individual Progress

Teachers were asked to indicate to what extent their particular course allowed students to progress at individual rates consistent with their abilities. At least half of the respondents do not permit this. Individual progress was made possible to a small extent in between 20 percent and 40 percent of the courses. It was highest in 4G, but fewer than 32 percent of teachers carried out individualized instruction for less than 20 percent of the time.

(d) *Resources*

Teachers were asked to indicate to what extent the listed resources were utilized by students in their courses. A summary of the data is provided in Tables 3.20 and 3.21.

Teachers of 4G and 4A reflect basically the same patterns in use of most resources. Teachers claimed that a main text was employed in approximately one-half of the 4G classes--over one half in the case of 4A When asked to list text titles in another section of the questionnaire,

TABLE 3.20

SECONDARY SCHOOL ENGLISH YEAR 4
TEACHING RESOURCES

Resource	Use by % of Teachers: Year 4G					Year 4A				
	N/A	Not at All	Small	Moderate	Great	N/A	Not at All	Small	Moderate	Great
Main Text	31%	20%		20%	29%	28%	19%	8%	4%	41%
Main Text plus Supplementary Texts	23	33	12	18	14	25	22	12	29	12
Two or More Main Texts	6	16	10	4	64	10	2	14	10	64
Reference Books		6	43	47	4	2	39	47	12	
Documents, Journals	2	63	27	8		2	37	47	10	4
Individualized Learning Packages	4	78	16	2		6	78	10	4	2
Magazines, Newspapers, etc.		24	43	29	4	2	45	31	22	
Audiovisual, Media		16	41	41	2	2	18	59	21	
Mimeographed Material	2	14	41	35	8	2	12	29	39	18
Other	6	82	4	2	6	6	86	2	2	4

TABLE 3.21

SECONDARY SCHOOL ENGLISH YEAR 5
TEACHING RESOURCES

	Use by % of Teachers									
	English Year 5					Anglais Year 5				
	N/A	Not at All	Small	Moderate	Great	N/A	Not at All	Small	Moderate	Great
Main Text	26%	21%	6%	6%	41%	21%	29%		7%	43%
Main Text plus Supplementary Text	21	22	16	33	8	14	14	7	22	43
Two or More Main Texts	2	6	6	18	68	14		7	79	
Reference Books		2	25	49	24			8	71	21
Documents, Journals		14	39	39	8	7	79	7	7	
Magazines, Newspapers, etc.	8	24	55	13			29	43	28	
Audiovisual Media	2	20	53	21	4		14	29	50	7
Mimeographed Material		14	28	33	25		14	21	43	22
Other	4	86		4	6		93	7		

however, most teachers who answered specified over two. The same number did not respond to "two or more main texts" in the resource question. In checking on ratings for the first three items of this question we find that invariably teachers who rated "two or more main texts" also rated the other two items, albeit with different code numbers. Therefore, the information about textbooks is not consistent in the two questions.

Reference books (including dictionaries and encyclopedias) were used in fewer 4A (59 percent) than 4G (94 percent) classes. The low number of teachers who used individualized learning packages (9 4G and 8 4A teachers) confirms the low degree to which courses allow individualization.

The discrepancy in use of texts noted in year 4 persists in year 5. Almost all (92 percent) of the teachers of year 5 English claimed that two or more main texts were employed, while 53 percent referred to one main text.

Reference books were, in general, moderately employed (49 percent) and approximately one-quarter of the teachers used them quite extensively. This may indicate a heavy emphasis on research essays or individual papers. Other resources generally were much less important: only mimeographed material was used extensively in 25 percent of the year 5 English courses. In general, emphasis seemed to be placed on two or more main texts and on research materials, possibly for essay writing.

Answers by year 5 Anglais teachers to this question and the request for names of textbooks used indicate a general reliance on two or more texts (3 teachers did not list any textbooks at all, one of them commenting that there were too many to list). Reference books were utilized fairly extensively by 13 or 14 teachers, but other resources were used much less than texts.

4. *ASSESSMENT OF STUDENT WORK*

(a) Exemption from Final Examinations

A substantial majority of English teachers (over 60 percent) indicated that students could be exempted from writing examinations. No final examination existed in 10-16 percent of the English courses (7 4G, 5 4A and 8 year 5).

In only 6 of the Anglais year 5 courses was there opportunity for exemption from the final examinations. (There was no final examination in 4 of the courses.)

Over half of all courses in which exemption from the final examination was allowed accepted an average term mark of over 60 percent - a small minority also required a teacher's recommendation.

(b) Methods of Evaluation

Research of methods of evaluation was conducted through school documents, interview data and questionnaires.

A summary of copies of English marking schemes and examinations received from 10 schools, together with interview data is provided in Table 3.22.

TABLE 3.22

SECONDARY SCHOOL ENGLISH
MARKING SCHEMES[a] IN DEPARTMENTS

No. of Schools 4G	4A	5	Term Work (%)	Final Examination (%)
8	10	11	50	50
8	7	8	60-75	25-40[b]
1	1	1	80-85	15-20
1			20	80
2	3	1	100[c]	
20	21	21		

a These data were collected during interviews with English department heads and from copies of evaluation documents

b One of these schools used an examination at the end of each term, not a final.

c The marks of three terms are averaged to equal 100 percent.

The 4G courses placing equal emphasis on term work and examinations are about the same number (8 schools) as those placing more emphasis on term work (9 schools). In one school far more emphasis is placed on the final examination and in two schools there is no final examination

The number of 4A and year 5 courses placing equal emphasis on term work and final examination is greater (10-11 schools) than that of those with more emphasis on term work (8-9 schools). There was no final examination in three schools with 4A courses and one school with year 5 courses.

On the questionnaire, teachers were asked to indicate approximately what percentage of the students' final mark (or grade, e.g., pass, fail, letter grade) was normally allocated to a number of categories of assessment. Many respondents remarked that the task of allocating percentages was very complicated, many admitted to very gross estimates and a few refused to do it.

For 4G, 4A and 5 English, where exemption from the final examination was possible, the final mark allocation analysis excluded marks assigned for final examination. In courses where all students were required to write the final examination it was included in the final mark allocation.

Tables 3.23 and 3.24 show the percentage of teachers estimating the percentage of their students' final mark normally allocated to each type of evaluation.

We can see in these data a remarkable similarity between the methods of evaluating students in 4G and in 4A English. When we examined the mean score we found that, on the average, 37 percent of a students' final mark would be based on a final examination in those 4G courses in which it was compulsory. (The mark ranged from 10 to 50 percent).

The mid-term examination was normally allocated about 19 percent of the student's final mark in English 4G and 4A; but in some courses it seems that there was no mid-term and, in others the mid-term accounted, on the average, for up to approximately 40 percent of the final mark. With the exception of the "other" cases, no more than 30 percent of the final mark was given to anything other than examinations, tests and individual papers.

TABLE 3.23

SECONDARY SCHOOL ENGLISH
FINAL MARK ALLOCATION

Item	Allocation of Final Mark (by % Ranges)														
	4G[a]					4A[a]					5[a]				
	0%	1-10%	11-30%	31-40%	41+%	0%	1-10%	11-30%	31-40%	41+%	0%	1-10%	11-30%	31-40%	41+%
Final examination[b]			43%	14%	43%			75%	17%	8%			75%	17%	8%
Mid-term examination	32%	4%	42	10	12	33%	6%	33	20	8	34%	2%	32	20	12
Other written tests	6	10	60	14	10	6	14	71	4	6	8	18	54	14	6
Other oral tests	80	20				75	23	2			84	14	2		
Individual papers	4	19	47	16	14	6	6	58	20	10	4	4	54	28	10
Group papers	71	25	4			75	25				82	14	4		
Individual projects	76	22	2			67	22	9	2		67	23	10		
Group projects	69	25	6			51	43	6			63	27	10		
Class participation	33	55	12			31	61	8			31	61	8		
Effort	57	43				61	33	6			59	37	4		
Attendance	80	20				84	16				80	20			
Individual oral presentation	71	27	2			55	41	4			61	33	6		
Group dramatic presentations	88	10	2			76	22	2			84	16			
Notebooks											88	4	4		4
Other	94	2			4	92	6		2		94	4			4

[a] 4G=49N; 4A=51N; Year 5=51N

[b] When respondents indicated that students could be exempted from their final examination, the final mark allocation was determined by excluding marks assigned for the final examination. When all students were required to write the final examination it was included in the final mark allocation.

TABLE 3.24

SECONDARY SCHOOL ANGLAIS YEAR 5[a]
FINAL MARK ALLOCATION

Item	Allocation of final mark (by % ranges)				
	0%	1-10%	11-30%	31-40%	41+%
Final Examination[b]	69%		23%	8%	
Mid-Term Examination	54		38		8
Other Written Tests		15	46	23	16
Individual Papers	8	23	46	15	8
Other Oral Tests	84	8		8	
Group Papers	54	46			
Individual Projects	54	38	8		
Group Projects	46	54			
Class Participation	15	69	16		
Effort	46	54			
Attendance	92	8			
Individual Oral Presentations	54	38	8		
Group Dramatic Presentations	69	23	8		
Notebooks	77	23			
Other	92			8	

[a]N=13

[b]When respondents indicated that students could be exempted from their final examination, the final mark allocation was determined by excluding marks assigned for the final examination. When all students were required to write the final examination it was included in the final mark allocation.

Year 5 teachers typically allotted 20 percent each to mid-term and other written tests and 25 percent to individual papers. Up to 10 percent was allotted to classroom participation. Most courses in which a final examination was compulsory (21 percent) used the examination mark to represent about 30 percent of the final mark. The one teacher who commented on the "other" entry explained that 60 percent was devoted to term work and "all the above were used with emphasis on tests, individual papers and oral presentations".

Most of the year 5 Anglais teachers used individual papers and other written tests to count for over 10 percent of the final mark. Over 30 percent of the mark was derived from individual papers in 3 of the courses and from tests in 5 of them. Mid-term examinations were used in 6 courses and counted for over 15 percent of the final mark.

The final mark allocation data for all four types of courses is quite similar, with emphasis on individual papers, tests and mid-term examinations. In courses (up to 40 percent of them) in which students were compelled to write the final examination, emphasis was also placed on it for the final mark.

D. Discussion

The English courses which most students take are the traditional type using more than one approach to literature study combined with essay writing, or special literature/composition type, using a single approach and essay, creative or practical writing. (Twelve percent of the 4G courses taken and none of the 4A or year 5 courses taken were other non-literature types.) Examination of specific objectives and general organization of courses shows that most teachers reported teaching virtually the same topics - literature and aspects of some language skills (listening is not dealt with in any formal way). More class time is spent on literature in the majority of courses. Writing, the skill most emphasized, was difficult to separate from literature study in many cases and has to be considered as out-of-class time. It was given 21 to 50 percent of formal instruction time by close to half of the year 4 teachers.

Most senior English teachers expressed a dissatisfaction with the preparation of their students, particularly in the area of literature and language skills. In fact, close to 40 percent of the year 4 and 5 English teachers preferred a much higher average level of competence than they perceived their students having--at least a two-point difference on the rating scale in both literature and language skills. (Twenty-six percent of year 5 teachers would prefer a similar improvement in writing skills.)

When senior English teachers are dissatisfied with the preparation of their incoming students and language skills receive less than 20 percent of formal instruction time in year 4 courses, it is not surprising that the gain in language achievement of students on completion of the course is not great. (Improvement in student competence from entry to exit in the language skill objectives ranged from 1.0 to 1.8 on the given rating scale.) However, the extent of variability of most ratings was high. The ratings for average level of student competence rarely exceeded "moderate competence."

The introduction of the credit system, the tentative character of Ministry guidelines in general and the lack of senior English guidelines since 1968 have affected the teaching of senior English. Ministry of Education senior English guidelines, RP-S4 (revised 1967) and S4-13 (1968) out of print for some time now, seemed to have inspired innovative, thematic and topical courses with literature approaches different from those in traditional literature/composition courses.

In senior English courses language skill development takes place in composition within a literature study context. In most courses, the bulk of composition appears to involve critical essays on literature or book reports. Although year 4 and 5 programs allow for more than one credit to be taken in English, the extra credits, taken by few students, usually emphasize the study of literature. Interview data from department heads confirmed that more emphasis was placed on literature (for 60-80 percent of class time) than on composition. (Only three of them (20 percent) declared more emphasis (55-66 percent) was placed on language and composition).

While conceding that more attention is required for language skill development, many teachers have said that with the reduction of teaching periods from 7 or 8 to 5, they are forced to provide less. Grammar analysis is considered by most senior English teachers as one important way of developing language skills; 82 percent of the 4G, 100 percent of 4A, and 96 percent of the year 5 teachers rated the average level of student competence in the objective "analyze language in terms of grammar". The reference made in the Intermediate guideline, I 020-040, to five research studies demonstrating that formal grammar instruction has no significant correlation with the improvement of language use, does not seem to have influenced senior English teaching.

In conclusion, the extent of variability in the nature of what teachers reported as taught is not great; however, the variability in the average level of student competence perceived by teachers is high in most objectives they considered important, especially at exit. In other words, student competence may have been uniformly low to medium at the beginning, but by the end of the courses not all teachers reported an equivalent increase in competence. On the average, improvement was acknowledged, but the variance of student capabilities increased as the year progressed.

Despite the attempt in the Anglais guideline, published in 1970, to distinguish an approach to second language teaching (ESL) from that of first language teaching, all but one of the 14 Anglais courses surveyed take on the appearance of English-as-first-language courses - only one resembled an ESL course. Five were described in calendars as traditional literature/composition courses using a variety of literature approaches and essay writing related to literature, and eight as special literature/composition with single literature approaches and essay, creative and/or practical writing. Between 9 and 11 of the Anglais teachers claimed they improved their students' level of competence in the three literature objectives on the questionnaire.

In terms of time allocation, half of the Anglais teachers reported they spent over 40 percent of their class time on literature and another four of them spent between 10 and 40 percent on it. Pre-twentieth century novels and plays seemed to have been the type of literature studied for over 20 percent of the time. Fewer Anglais courses studied

Canadian other than French-Canadian literature (8 spent over 10 percent of the time on it), than British (10) and American (11). Only three courses studied French-Canadian literature in translation. Emphasis on the study of media other than literature was minimal (7 teachers dealt with one of the eleven objectives, critical assessment of film, and spent less than 10 percent of their class time on it).

Language skills - reading, speaking, listening, writing and language study - were not dealt with in 2 to 6 courses and not given over 20 percent of class time (except for writing: 5 of the courses devoted between 21 and 60 percent of the time on it).

Most Franco-Ontarian students require a special kind of English teaching. One Anglais teacher commented that his students' English-speaking abilities ranged from "excellent to mediocre". Two Anglais experts interviewed described the majority of Francophones as functionally bilingual; they read in French and their spoken English is influenced by the English spoken by other Francophones. English, although a second language, is their dominant language: it is most likely spoken in the home. Their English was described as a "popular" type of "street" English. Dr. Lionel Desjarlais (1975) speaks of sociogeographic more than school factors influencing a Franco-Ontarian student's ability to speak English. One interviewee who claimed to be aware of the nature of Anglais teaching stated that Anglais courses are either the "watered-down" English type or the classical ESL courses with the stuctured linguistic approach. (Only one of the 14 courses surveyed was described as the latter; the others have the appearance of the former.) He reported that what is needed is a course with the assets of both approaches. Also, students are rarely asked to operate in communication situations different from what they are ordinarily accustomed to in their own social milieu.

The mean scores for all of the exit ratings for average level of student competence in the important objectives (taught in over half of the courses) were very low to medium low, all below moderate competence (except for one, oral summary: moderate competence). The variability in teacher ratings was also low.

This information is not surprising when a higher competence level was preferred from incoming students by over 40 percent of the instructors with respect to most of the objectives. When teachers expressed dissatisfaction with the abilities of their students in language skills at the beginning of the course, one would expect heavier concentration on these skills than they seemed to have received.

COLLEGE ENGLISH YEAR 1

A. The Sample

In the sample of 15 colleges surveyed, there were 155 first-year English courses offered, in a total of 523 different programs. Of these courses we selected 53 for our survey.

The description of the population of courses that follows is derived from 1975/6 calendars and substantiated with interview comments from 16 course supervisors (chairmen, department heads, deans)

Courses were offered in 3 main divisions: Business, Technology, and General Arts and Science/Applied Liberal Studies (these two titles are the common ones used for divisions that in most colleges are substantially the same). The breakdown of the courses offered and selected is reported in Table 3.25.

TABLE 3.25

COLLEGE ENGLISH YEAR 1
COURSES[a] IN THE SAMPLE OF COLLEGES

Division	Programs in which English offered	English	
		Courses offered	Courses selected
Business	102	28	20
Technology	227	34	18
General Arts & Science/ Applied Liberal Studies	173	44	16
Other[b]	21	17	12
Totals	523	123	66[c]

[a] In 3 colleges, first year students in all divisions were required to choose elective(s) from a common list which varied in number from 18 to 37. Consequently, 32 courses in these three colleges are unaccounted for in the above data.

[b] Divisions included are Mathematics and Science, Health and Welfare Science, Nursing, Computer Studies, Occupational Training, English and Media Studies.

[c] In some cases, the English course was the same for all divisions, therefore, the total here does not correspond to the number surveyed.

In the Business division, calendar descriptions indicated that topics dealt with the basic skills of language, business correspondence and applications of vocabulary. Secretaries were also encouraged to take basic communication courses which aided in recording, vocabulary development, writing, listening, comprehension and speech.

In the Technology division most programs required students to take at least one English course in their first year. Some English courses taught these students the principles of basic communication. Others assisted technology students in methods of research including library use, and in building writing competency. Courses in critical analysis of prose (fiction and non-fiction) were also open to technology students.

English courses offered to students in General Arts and Science/ Applied Liberal Studies divisions were varied and numerous. Language and Communication was a recommended course in many programs, but the majority of English courses were simply electives such as: grammar and the building of language skills, Canadian and American Literature, critical approach to drama and the short story, historical surveys of major authors and the role of women in Western society.

According to the interview data, remedial courses in which students practiced reading and writing, were offered in ten of the colleges. (These were not specified in calendars.) Thirteen chairmen said that their first year courses contained a remedial component either built into the curricula or allowing for extra help on an individual basis.

According to 11 chairmen, all new courses added since 1968 were remediation oriented, introduced to meet the recognized need to improve the language skills of college students. Both college faculty and employers appear to have exerted influence in this matter.

Of the 123 first year English courses offered in the colleges in 1975/6, the instructors of 53, or 43 percent of them were sent questionnaires. Since in most cases communication courses were the norm, this type of course was selected as the basic unit for analysis. Also, first semester courses were surveyed; only when this type of course was not offered in first semester was a second semester course selected.

B. Factors Influencing The Teaching Of Courses

1. *BACKGROUND OF THE INSTRUCTORS*

Figure 1 provides a summary of the information collected about the background of instructors. The majority of instructors surveyed (66 percent) had over six years of college teaching experience. They should, then, be thoroughly familiar with types of students enrolled in college courses, although the rather high percentage that had been teaching for only 1-2 years (19 percent) should be noted.

Most instructors (79 percent) had been teaching the selected course for at least two years; however, 11 instructors were teaching the course for the first time in the year of the survey.

Since Business and Technology are two main divisions in which English courses are offered, it would seem to be to the students' benefit for instructors of such courses to have had some professional experience in business or technology in order to conduct a more relevant English course. However, only one-third of the teachers had had more than two years of related professional (nonteaching) experience. Close to half of the college English instructors (43 percent) held a Master's degree. Forty-two percent were teaching in their area of specialization; 45 percent in an area closely related.

Fourteen (29 percent) of the instructors, responding to a question about other teaching experience they might have had, had taught at the secondary school level, and should, therefore, have knowledge of problems on both sides of the interface.

2. *PREREQUISITES*

The standard admission requirement to a college program is successful completion of the Ontario Secondary School Graduation Diploma or its equivalent. Eight respondents stated that a pretest, such as a reading or fundamental English test, was required of entrants into their courses.

3. *CHARACTERISTICS OF INCOMING STUDENTS*

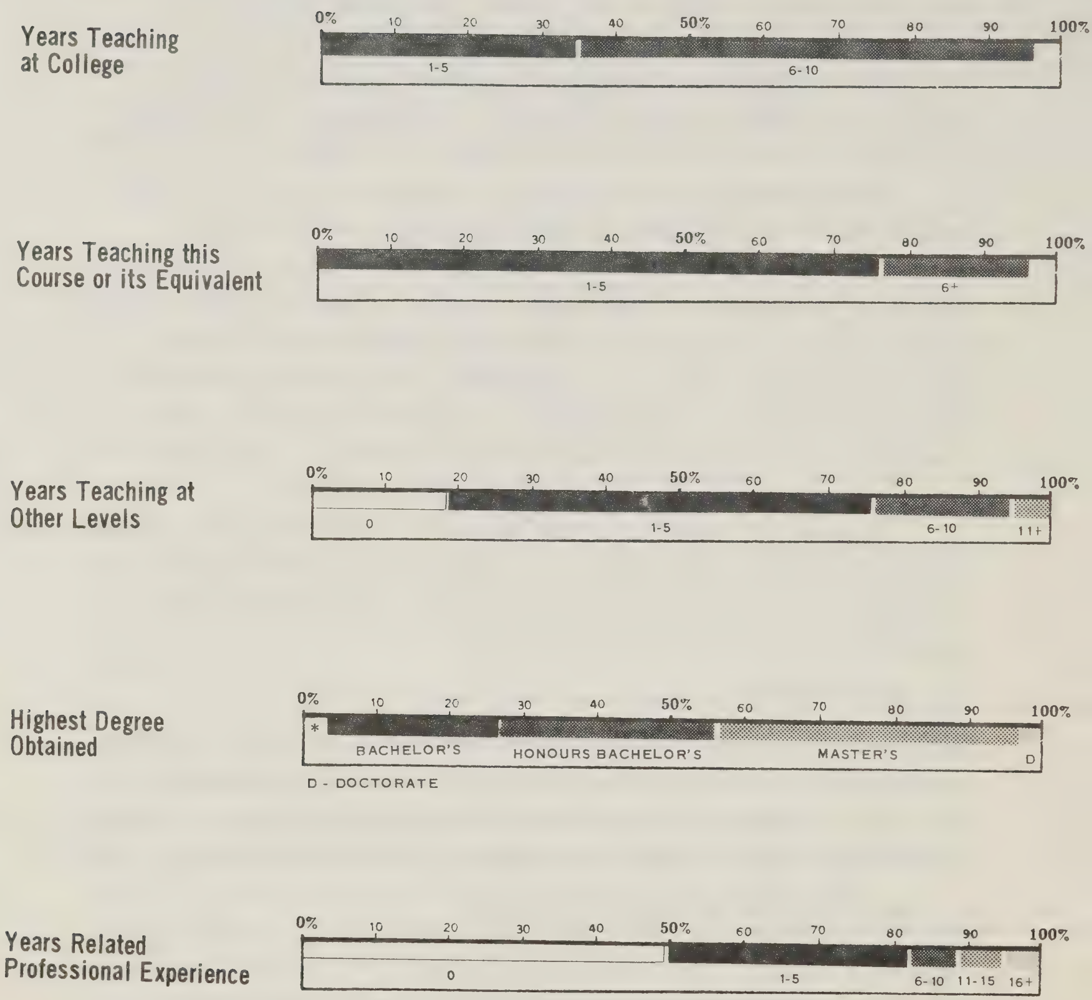
(a) Variability

Most college English instructors (87 percent), when questioned in general terms, perceived a great deal of variation in the competencies of students entering their English course.

Figure 3

BACKGROUND OF INSTRUCTORS

COLLEGES OF APPLIED ARTS & TECHNOLOGY ENGLISH YEAR 1
PERCENTAGE OF INSTRUCTORS IN EACH CATEGORY



Respondents were also asked to rate the average level of competence of incoming students with respect to each specific objective listed in Section IV of the questionnaire. Suffice it to say at this point that instructor perceptions of student competence at entry to and exit from their courses varied greatly from college to college and from course to course.

(b) Quality of Preparation

In response to a general question regarding the quality of students' preparation, 63 percent of the instructors claimed that it was fair and 31 percent went as far as to say that it was poor. The impact of these responses to the single question of preparation should be somewhat tempered by the ratings of competence with reference to specific objectives which will be seen in Part C below.

Instructors responded to an open-ended question indicating areas in which incoming students were well or poorly prepared. Over a third (38 percent) of the college English teachers commented on their students' positive attitudes toward learning while almost the same number (34 percent) complained of some negative ones. Ten instructors (19 percent) declared that students were well prepared in skills, oral competency being most mentioned. However, over three-quarters of the respondents (77 percent) were dissatisfied with student preparation in these English skills: techniques of reading, writing, comprehension,library use, note-taking, and speaking. Another quarter felt that preparation was poor in the area of subject knowledge.

The dissatisfaction of college English instructors with the preparation of incoming students was further expressed in their preferences about incoming students' level of competence in specific areas. We explained in the corresponding section of the secondary school report how the satisfaction index was computed. Table 3.26 presents clusters of objectives for which college instructors preferred a higher level of competence than they actually perceived.

TABLE 3.26

COLLEGE ENGLISH YEAR 1
PERCENTAGE RANGES OF INSTRUCTORS PREFERRING A HIGHER LEVEL OF STUDENT COMPETENCE AT ENTRY

Topic	% ranges of instructors				
	81-100%	61-80%	41-60%	20-40%	20%
Literature (9)[a]				9	
Comprehension/ Analysis (3)	2[b]	1			
Reading (2)	1	1			
Writing (18)	9	5	2	2	
Oral (6)		3	2	1	
Language (2)	1	1			
Research Techniques (2)		2			
Media (2)			1		1
Total	13	13	5	12	1

[a]No. of subtopics in each category

[b]No. of subtopics in each % range

Over 60 percent of the instructors preferred a higher level of competence at entry in over half of the objectives (26). Writing, comprehension and analysis, reading, oral communication, language study, and research techniques were the most criticized areas. Most of the college instructors, in summary, were dissatisfied with the level of student competence in topics they considered important in their courses.

4. OTHER FACTORS INFLUENCING TEACHING

Respondents were asked to rate factors which had influenced their teaching of the surveyed course. Their responses are summarized in Table 3.27.

The knowledge of English possessed by incoming students ranked first in consideration. In fact, two-thirds of the college instructors claimed that their students' degree of preparation (we have assumed that "knowledge" was interpreted broadly to include skills) greatly influenced their teaching.

The interests of students, the second important consideration, influenced teaching to at least a moderate extent--so declared 81 percent of the respondents. Thirty-five percent of them claimed their teaching was greatly directed towards the varied interests of students.

One would expect that because the college English courses surveyed were primarily first semester courses, many having remedial components, they would be essentially coordinated with the other courses in the program. Indeed, this factor was rated comparatively high. However, 28 percent of instructors said it was of little or no importance. Since the communications courses are basic components of specific programs, it is surprising to find that 40 percent of the instructors were only moderately influenced by information about students' subsequent courses, programs and careers.

TABLE 3.27

COLLEGE ENGLISH YEAR 1
FACTORS INFLUENCING TEACHING OF THE COURSE

Factor	WM[a]	R[b]
Interests of students	2.1	2
Students' knowledge	2.3	1
Relationship with concurrent courses	2.0	3
Information on students' future plans	1.8	5
Ontario Ministry of Education guidelines	0.3	10
Assigned course outline	1.7	6
Teacher's special interests or training	2.0	3
Principal text(s) (Content and approach)	1.5	7
Staffing	0.9	8
Other	0.6	9

[a]WM= weighted mean. Each category was assigned a weighting: 0-not at all, 1- to a small extent, 2- to a moderate extent, 3-to a great extent. For each item the number of reponses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.
[b]R= rank. Factors were ranked on the basis of weighted means.

In most of the colleges, chairmen reported that teachers were allowed flexibility within objectives set by committees, and two colleges reported that teachers had almost complete freedom to design the English course they teach. Thus the course outline assigned to 55 percent of the first year English instructors influenced their teaching at least moderately, while 32 percent reported flexibility in designing their own course.

Analysis of textbooks used was complicated by responses to the question of textbook titles. Thirteen (24 percent) did not respond to this question, two reported there were too many texts to list and two said the course had no text. Three respondents referred to texts written within the college. There were almost as many composition texts listed as there were teachers responding. However, 8 texts in particular were used by a total of 18 separate courses--2 to 5 courses using each.

Where staffing was an influence, reasons given included "unevenness of teaching expertise", "increase in the number of sections required", "team teaching" and "small staff interferes with optimum individual attention".

Other factors that were cited by a quarter of the instructors (24 percent) related to practical needs such as demands of time, availability of programmed material and laboratory facilities. In one instance, an instructor commented that the wide range of students' competencies necessitated individualized instruction.

C. Characteristics of the Course

The difficulties encountered in compiling the list of aims and of specific objectives for the questionnaire are discussed in this section of the secondary school English report.

1. AIMS

Written English and ability to organize and integrate ideas and materials are well to the forefront of instructors' attention, as Table 3.28 clearly demonstrates.

TABLE 3.28

COLLEGE ENGLISH YEAR 1
EMPHASIS ON GENERAL AIMS

Aim	WM[a]	R[b]
Explore the universal elements in human experience through the study of literature	1.0	17
Develop student's ability to listen effectively	1.8	14
Develop sense of self-worth and confidence	2.1	8
Cultivate student's discrimination in reading	2.0	10
Develop respect and tolerance for diverse opinions and ideas; encourage a broader perspective	2.0	10
Promote fluent and grammatically acceptable spoken English	2.1	8
Develop appreciation of the historical development of English literature	.4	21
Develop student's ability to organize and integrate ideas and materials	2.7	2
Develop an attitude of enquiry	2.2	7
Develop discipline to initiate a piece of work and complete it in a given time	2.3	4
Promote fluent and grammatically acceptable written English	2.8	1
Improve student's understanding of the characteristics of the language	2.0	12

[a]WM= weighted mean. Each category was assigned a weighting: 0-not at all; 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b]R= rank. Factors were ranked on the basis of weighted means.

TABLE 3.28 (Cont'd)

COLLEGE ENGLISH YEAR 1
EMPHASIS ON GENERAL AIMS

Aim	WM	R
Improve student's reading ability	2.3	5
Develop student's desire to read.	2.0	10
Develop awareness of the literary and cultural heritage of the English language.	.9	19
Enrich the student's spoken and written vocabulary.	2.3	5
Develop student's creative potential	1.6	15
Develop an appreciation of literature	1.3	16
Develop an appreciation of media other than literature (e.g., film, television, etc.)	1.0	17
Develop student's ability to think critically	2.4	3
Other, please specify	.7	20

Critical thinking, discipline to initiate and complete work, reading ability and vocabulary were the aims next in order of importance. We find that 81 to 86 percent of the respondents declared they emphasized all of these aims at least to a moderate extent.

The aims least emphasized were those five associated with literature and media other than literature. A very consistent picture emerges: college English courses evince far more concern with writing, reading, self-development and attitudinal aims than with those related to literature and media.

2. *SPECIFIC OBJECTIVES*

A description of the procedure for rating the actual and preferred average level of competence of students at entry to and exit from the course is described in the Section C.2 of the secondary school English report.

(a) Course Content

Table 3.29 shows in summary format the percentage ranges of instructors. teaching each subtopic within the eight topic areas.

TABLE 3.29

COLLEGE ENGLISH YEAR 1
COVERAGE OF THE OBJECTIVES OF THE COURSE

Topic	% ranges of Instructors				
	81-100%	61-80%	41-60%	20-40%	<20%
Literature (9)[a]				5	4
Media (2)			1		1
Reading (2)	1[b]	1			
Writing (18)	8	5	2	2	1
Oral (6)		5			1
Language study (2)	1		1		
Comprehension/Analysis (3)	3				
Research (2)		2			
Total	13	13	4	7	7

[a]No. of objectives in each cluster given in parentheses

[b]No. of subtopics in each category

The concentration of instructors' attention on reading, writing and comprehension--all heavily stressed general aims--will be immediately apparent. It is equally consistent that all 9 of the literature objectives were taught by fewer than 28 percent of teachers. Creative writing, editorials and use of language in poetry were treated in fewer than 36 percent of the college courses. Forty-five percent of the respondents taught their students critical assessment of film, television, magazines, newspapers, etc.

It is helpful to examine the level of consistency of our data about reading objectives with that of Project II, Nature of Students. In Project III, 81 percent of the respondents claimed that a great deal or a moderate degree of emphasis was placed on improving students' reading ability, and 85 percent taught aspects of comprehension. In the Project II results, 75 percent of respondents declared that their courses placed considerable emphasis on reading for literal understanding and 87 percent of them gave the same amount of emphasis to reading for comprehension. The data on comprehension from both projects appear to be quite consistent--more so than the corresponding information about inferential skills, where 91 percent of the Project III respondents claimed they taught inferential skill development, yet, only 69 percent of Project II respondents gave heavy to moderately heavy emphasis to "drawing inferences and seeing implications".

Essay writing was given heavy to moderately-heavy emphasis by 87 percent of the Project II respondents, while 77 percent of our respondents said they taught it sufficiently well to improve students competence.

(b) English Instructors' Perceptions of Actual Average Level of Student Competence at Entry and Exit

Instructors' mean ratings of student competence for each objective at the beginning and end of the course are set out in Table 3.30 shows the rating scale used is described in Section C of the secondary school English report. These means are based on responses of all instructors who assigned a rating to an objective whether or not it was treated in the course. We considered that an objective was treated if the rating of average level of student competence increased from entry to exit.

TABLE 3.30

COLLEGE ENGLISH YEAR 1
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

Objective	% Teaching[a]	% Rating[b]	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
Literature						
1. Analyze literature through an examination of its characteristics	26	28	1.4	.9	3.0	1.4
2. Analyze literature in terms of the relationship of organization to meaning	28	30	.9	.8	2.6	1.3
3. Identify literary genres by examination of their characteristics	19	25	.6	.8	1.9	1.2
4. Write a literary critique	19	26	1.1	1.1	2.4	1.8
5. Apply a critical vocabulary in the evaluation of the range, nature and quality of a particular work	19	26	.8	.7	2.2	1.5
6. Explain the relationship between the text and extrinsic materials (e.g., biographical, historical, mythological)	19	28	.6	.7	1.8	1.6
7. Analyze literary forms in terms of stylistic techniques (e.g., style, tone, form)	25	30	.7	.8	1.9	1.4
8. Analyze literary forms in terms of connotation (e.g., word, image, sound)	28	36	.8	1.2	2.2	1.7
9. Evaluate written and oral critiques	23	28	.8	.9	2.1	1.4

[a]Percentage of instructors teaching the topic.

[b]Percentage of instructors who indicated a student competence level.

TABLE 3.30 (Cont'd)

COLLEGE ENGLISH YEAR 1
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

Objective	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
Media Other Than Literature						
1. Critically assess film, television, magazines, newspapers, etc.	45	45	1.2	.9	3.2	1.2
2. Present a mass media production	13	23	.4	1.2	1.3	1.6
Comprehension/Analysis						
1. Comprehend a variety of materials (essential meaning and significant details)	85	92	1.8	.9	3.6	1.2
2. Understand the subtler nuances of language (e.g., emotional connotation of words, imaginative effects of language use)	87	91	1.2	.9	2.8	1.2
3. Distinguish between essential and non-essential information	89	94	1.8	.9	3.7	1.0
Reading						
1. Apply inferential skills	91	94	1.3	.9	2.9	1.3
2. Apply flexibility in the speed of reading appropriate to content and purpose	72	83	1.2	.9	3.1	1.2
Writing						
1. Support generalizations with appropriate evidence	92	94	1.4	.9	3.5	1.3
2. Write an effective sentence	91	96	1.9	1.2	3.8	1.2
3. Write an effective paragraph	89	92	1.8	1.3	3.7	1.3
Demonstrate facility in writing in terms of planning organization, presentation and editing:						
4. Essays, (expository prose)	77	85	1.3	.9	3.4	1.2

TABLE 3.30 (Cont'd)

COLLEGE ENGLISH YEAR 1
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

Objective	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
5. creative writing (personal essays, descriptions, poems, short stories, etc.)	36	51	1.2	.8	2.6	1.5
6. précis, summary and abstract	74	77	1.1	.8	3.1	1.1
7. memos	57	62	1.1	.8	3.2	1.3
8. letters	64	68	1.2	.7	3.5	1.1
9. reports	66	68	1.0	.8	3.6	1.0
10. editorials	21	26	.5	.6	2.3	1.5
In written work:						
11. use language in a grammatically appropriate manner.	92	96	1.8	.9	3.5	1.0
12. use words with precision	92	92	1.4	.8	3.1	.9
13. use words with subtlety	81	86	1.0	.9	2.6	1.2
14. write in a style appropriate to content and audience.	85	87	1.2	.9	3.2	1.1
Use language imaginatively in writing:						
15. poetry	15	30	1.1	1.2	1.9	1.5
16. prose	49	60	1.3	1.1	2.7	1.5
17. Present an argument effectively.	81	91	1.3	.9	3.0	1.3
18. Use effective note-taking techniques	68	77	1.1	.9	2.8	1.3
Research						
Use research techniques effectively:						
1. use library efficiently (indexes, reference materials)	70	75	1.0	.9	3.2	1.3
2. use appropriate conventions related to acknowledging references (e.g., footnotes, bibliography).	70	70	.6	.9	3.2	1.3
Oral Work						
In oral work:						
1. Speak in a style appropriate to audience and subject matter.	66	68	1.6	1.0	3.3	1.4

TABLE 3.30 (Cont'd)

COLLEGE ENGLISH YEAR 1
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

Objective	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
2. use words with precision	72	75	1.2	.8	3.0	1.1
3. use words with subtlety	68	70	.8	.9	2.4	1.1
4. present an argument effectively	74	75	1.1	.9	3.0	1.1
5. contribute effectively in a small group discussion	64	68	2.0	1.3	3.6	1.4
6. participate in a dramatic performance	17	28	.8	.9	2.1	1.9
<u>Language Study</u>						
Analyze language in terms of:						
1. grammar	81	87	.9	.7	3.0	1.2
2. linguistics (origin and characteristics)	53	68	.5	.6	1.7	1.2

These data should be interpreted rather tentatively. A substantial number (7) of the instructors complained that they found it difficult to rate objectives with respect to an average level of competence (one refused to complete rating objectives). This difficulty may be compounded by a factor that emerged in at least two questionnaires--for many students in these courses, English is a second language. Comments by the instructors help to clarify the nature of the problem.

> Because my course was especially designed for students who were in serious difficulty because of language skill deficiencies, I wasn't able to think of them as typical in any way. There were two broad categories-ESL and English-speaking students. Each of these groups could be divided again into students who had severe emotional difficulties and students who were well-motivated and wanted to succeed.
>
> It has been difficult for me to generalize about my students. The survey seems to be geared to the Canadian student; however, approximately 25 percent of the students in my course are from other countries (West Indies, Africa, Hong Kong, India, South America), and for many of these students, English is a 2nd (or 3rd) language.

The ratings of the objectives in the above two courses were usually low and, of course, contribute toward lowering the mean scores to a degree.

Four instructors commented that the list of objectives did not allow them adequately to describe their courses; but only two referred to specific objectives which should have been added.
One said, "The objectives of the course are:

1. Writing: to be able to write a page and one half, double-spaced which is free of spelling, punctuation and grammatical errors.
2. Reading: the student should be able to read 350 words per minute of specific prose with 80 percent comprehension."

It seems to hold that if a teacher at the college level did not teach the objective, he also did not rate it as being important; however, discrepancies occurred between the number rating and number teaching some objectives--differences ranged from 1-8 teachers. Literature, for instance, is an area taught by between 19-28 percent and rated by up to 36 percent of the instructors.

In the area of comprehension and analysis, the three objectives show a high percentage teaching and rating (85-94 percent) and a substantial improvement at exit of 1.8, 1.6 and 1.9 points on the rating scale. The variation of ratings is high (SD=1.2).

Both reading objectives were taught by 91 and 72 percent of teachers respectively. Exit levels of 2.9 and 3.1 (1.6 and 1.9 differences from entry to exit) indicate that students are moderately competent readers in the first year of college. We should note, however, that the variability of ratings at exit is high (SD=1.2 and 1.3).

Writing again emerges as an area of considerable importance. Two representative objectives "support generalizations with appropriate evidence", and "use language in a grammatically appropriate manner" were both taught extensively (92 percent) and the entry level of students was considered quite low (1.4 and 1.8). Exit levels were perceived by the instructors as considerably improved (3.5 for both), with a difference from entry to exit of 2.1 and 1.7. We speak of average ratings here, and it is important to notice the high variability of ratings (SD=1.3 and 1.0).

Very technical areas of writing, such as writing letters, memos, and reports, although not taught by a high percentage of teachers (up to 66 percent), were viewed as showing marked improvement of 2.1 to 2.6 points from entry to exit. Again we see a relatively wide spread of scores (SD=1.1 and 1.3).

Under the heading of oral work, teachers placed moderate emphasis on all but one objective, with 64-74 percent of the teachers actually teaching or rating them. Speaking in an appropriate style and contributing effectively in a small group discussion were both rated relatively high at exit (3.3 and 3.6) and the perceived gain in student competence was over one and a half points on the scale (1.6 and 1.7).

In language study, 81 percent of teachers taught analysis of language in terms of grammar and improvement from entry to exit level was perceived to be 2.1. The average level of competence at exit was rated as moderate, but some rated their students as having almost attained "competence in varied situations."

(c) General Organization of the Course, Including Time Allocations.

TABLE 3.31

COLLEGE ENGLISH YEAR 1
TIME ALLOCATIONS

Topic	% ranges of total course time allocated					
	0%	1-10%	11-20%	21-40%	41-50%	51+%
Literature	68%[a]	9%	9%	5%		9%
Media: Critical Assessment	63	22	13	2		
Media: Production	83	13	4			
Language Skills:						
Reading	15	31	28	14	4	8
Writing	9	11	2	27	17	34
Speaking	25	41	17	17		

[a]% of teachers in this category

Table 3.31 shows that only a third of the college teachers (32 percent) devoted any formal instruction time to literature, confirming the relatively low importance that instructors earlier placed on this area.

We checked literature objectives taught against time allotted to literature to find that some inconsistencies emerged. In 5 cases, instructors indicated they spent time on literature, yet they did not rate student competence with reference to any literature objectives. In 5 more cases, literature did not receive any class time, but competence in some literature objectives was rated. A few instructors explained that literature was used as a method of teaching reading, speaking and writing.

Writing is the area in which most class time was spent (51 percent of the instructors spent over 41 percent of the time on it).

Only about a third of the respondents (37 percent) claimed to spend class time on critical assessment of media and even fewer (17 percent) on production.

Since over 70 percent of the respondents reported they taught certain reading and speaking skills and these were emphasized as aims by over 80 percent of them, one might expect that more class time was spent on these skills than was reported in the above table.

For example, in about a third of the courses, less than 10 percent class time was spent on reading (31 percent) and speaking (41 percent) and in most of the courses they received less than 40 percent of the time.

(d) Approaches to Literature

Teachers were asked to indicate the main approaches taken to the study of literature. The 16 instructors who answered this question correspond to the number who declared in Table 3.31 that they devoted time to literature study. The picture they present is very variable, with answers rather evenly spread across several categories, but the most frequently cited were: a variety of approaches (25 percent of all respondents), by ideas and concepts (19 percent) and by theme (25 percent).

The few college instructors who taught literature were asked to indicate the amount of time which the student spent working on the various genres, periods and national literatures.

No more than 14 teachers responded to any one item and, for the most part, less than 40 percent of class time was spent on any of the standard forms of literature. Novels and short stories were perhaps the most popular forms: 5 out of 11 respondents spent 21-40 percent of the time on novels; instructors, overall, paid some attention to short stories and poetry.

Analysis of the responses by period or national literature provides some more significant results: 13 of the 14 respondents spent more than 50 percent of their teaching time on contemporary literature, and 8 of the 14 who taught Canadian literature did so for more than half of their course time.

3. TEACHING METHODS

(a) Instructional Techniques

According to interview data from 16 course supervisors, only one college reported no changes in instructional techniques used in first year courses since 1968. The other colleges referred to a decrease in lecturing – giving way to more individualized techniques to deal with students' weaknesses in basic skills.

On the questionnaires, teachers were asked to approximate percentages of in-class time allocated to the various instructional techniques employed during the year. We have grouped their estimates into three time percentage intervals in Table 3.32.

TABLE 3.32

COLLEGE ENGLISH YEAR 1
TEACHING METHODS

Methods	% of instructors using for % range of time			
	0%	1-20%	21-50%	51+%
Lecture	21%	54%	21%	4%
Socratic	11	51	28	10
Small group activities	47	39	12	2
Seminar tutorial	57	32	11	
Student presentations	51	47	2	
Testing	19	79	2	
Audiovisual	44	62	4	
Field trips	83	17		
Dramatic presentation	75	25		
Classroom study	24	64	12	
Individualized instruction	57	21	9	13
Other	85	13	2	

According to the summarized questionnaire responses, Socratic teaching and lecturing were more heavily used, in more courses, for a greater percentage of time than any other teaching approach. Since many instructors later reported that continuous evaluation was employed in their courses, it is quite consistent that testing occupied a part of the time in many courses (81 percent).

The relatively high number of courses which used individual classroom study (76 percent), small group activities (53 percent), seminars (43 percent) and individualized instruction (43 percent) is supported by instructors' answers to a question about the degree of individualization permitted in their courses. Only 30 percent made no such provision; the remainder were rather evenly distributed over the 3 categories to a small, moderate, or great extent.

b. Resources

College teachers were asked to indicate to what extent their students utilized various resources in the surveyed course.

TABLE 3.33

COLLEGE ENGLISH YEAR 1
TEACHING RESOURCES

Resource	Use by % of Teachers				
	N/A	Not at all	Small	Moderate	Great
Main text	13%	29%	13%	17%	28%
Main text plus supplementary text(s)	15	38	19	9	19
Two or more main texts	11	36	8	15	30
Reference books	4	4	26	45	21
Documents, journals	6	4	28	13	10
Individualized learning packages	8	61	6	4	23
Magazines, newspapers, etc.	4	34	34	15	13
Audiovisual media	4	23	30	30	13
Mimeographed material	6	19	24	28	23
Other	6	75	6	7	6

Despite the large number (70 percent) which had an individualized learning approach, some first semester communications courses (23 percent) depended heavily on individualized packages while the majority (61 percent) did not. Individualized learning methods usually rely on a combination of mimeographed material, text excerpts and audiovisual media. The figures in Table 3.33 are very consistent with such a pattern. There is high use of mimeographed material (75 percent) and audiovisual media (73 percent). Reference books, such as dictionaries are naturally used at least moderately in two-thirds of these communication courses along with texts in 45 percent of them.

(c) Out-of-Class Work

College instructors vary in their attitudes toward out-of-class work: 42 percent of them expected no more than half an hour out-of-class time for every hour of class time and some of these (18 percent) expected less than 15 minutes. A similar percentage (45 percent) indicated that they rely fairly heavily on homework, expecting between three-quarters of an hour and an hour and a half for every hour of class time.

4. ASSESSMENT OF STUDENT WORK

Over half (51 percent) of the courses did not have final examinations. Twenty-six percent of the instructors indicated it was possible for students to be exempt from writing the final examination in their course on the basis of term work, and the remaining 23 percent required students to write a final examination. Conditions for exemption generally ranged from successful completion of all written assignments to near perfect attendance. The most common exemption criteria were successful completion of a pretest for the course and successful completion of assignments. Some instructors, as earlier mentioned, continuously evaluated students throughout the course.

The college respondents were asked to estimate the percentage of the students' final mark (or grade, e.g., pass/fail, letter grade) normally allocated to types of assessment. In courses where exemption from final examination was possible (26 percent), the final mark allocation (Table 3.34) excluded marks assigned for final examination. In courses where all students were required to write the final (23 percent) it was included in the final mark allocation. The data in Table 3.34 illustrate a propensity on the part of college teachers to favour individual papers and shorter written tests as the more important methods for arriving at students' marks. Where the final examination was mandatory it accounted, in some cases, for up to half of the students' final mark. Effort, attendance and class participation can account for more than 40 percent of the final mark, in some cases, and group work counts for very little.

TABLE 3.34

COLLEGE ENGLISH YEAR 1
FINAL MARK ALLOCATION

Item	Allocation of final mark (by % ranges)			
	0-10%	11-30%	31-40%	Over 41%
Final examination	10%[a]	40%	20%	30%
Mid-term examinations	38	62		
Other written tests	21	34	9	36
Other oral tests	60	40		
Individual papers	5	42	16	37
Group or team papers	75	25		
Individual projects	46	54		
Group or team projects	83		17	
Class participation	66	31		3
Effort	63	21	5	11
Attendance	69	19		12
Individual oral presentation	72	28		
Group dramatic presentations				
Notebooks				
Other	58	14	14	14

[a] % of teachers in each % range

D. Discussion

Most of the students in the college English courses are year 4, general level English graduates who have not had a great deal of success in school. (A growing but lesser percentage comes from 4A and others are immigrants or new Canadians for whom English is a second language). Rather appropriately, a number of college instructors (8) expressed a very supportive attitude toward their students. A few instructors commented that their courses principally emphasized the development of interpersonal skills and the building of students' self-confidence.

The first semester courses are not necessarily representative of all first year courses. For the most part, the first semester courses are communication courses designed to develop practical language skills for vocation-oriented students. Many contain a remedial component, although distinct remedial courses (a third are non-credit) were offered in ten colleges. Elective courses other than communication courses were offered particularly in the general arts/ liberal studies division. In contrast to the language-skill objectives treated in over 70 percent of the courses, literature aims were not emphasized to a great degree in more than 42 percent of courses and the nine literature objectives were treated in less than 28 percent of the courses. A third of the instructors spent little formal instruction time on literature whereas half of them spent over 40 percent of the time on writing skills and a quarter of them spent over 20 percent of the time on reading. Five of the instructors had class time spent on literature but did not rate student competence in literature because it was used basically as an impetus for the development of reading, speaking and writing skills. (Five others rated competence in literature but did not indicate that time was spent on it).

Learning by means of individualized methods (learning packages, individual classroom study, small group activities, and audiovisual media) was the approach to some degree in most of the courses (70 percent). About half of the courses had no final examination and a quarter used an exemption system.

The most common exemption criteria were successful completion of a pretest and continuous evaluation throughout the term. This evaluation information is congruent with the commonly used individualized learning approach.

With regard to the ratings of the average entry and exit level of competence in their students, a small number of the instructors (13 percent) commented on the difficulty of generalizing because of the mixture of second language students with first. The degree of improvement from entry to exit in those objectives treated in over half of the courses ranged from 1.6 to 2.6 points in accordance with the rating scale so that entry levels were very low to low (below 2.0: close to "minimal competence"), but the exit level competence in some cases, particularly in writing objectives, was close to 5.0, "competence in varied situations, with some originality". (It is important to note the high variability of ratings with standard deviations above 1.0).

The overwhelming majority of college instructors reported a great deal of variation in the competencies of incoming students. Over 60 percent of them preferred a higher level of competence in close to half of the objectives. Most colleges seem to have a pretest system whereby students can be directed into remedial components in the standard communication course. It seems that, if teacher perceptions of low level of student competence are accurate, there remains a need for basic skill development, effective diagnostic testing and more streaming of students into special courses.

UNIVERSITY ENGLISH YEAR 1

A. The Sample

1. *THE POPULATION OF COURSES*

Twenty-six first year English courses in ten universities were surveyed. Information about the nature of the courses offered by the sampled institutions was gathered from university calendars for 1975/6 and from interviews conducted with the chairmen of the ten English departments. We assumed that courses outlined in the calendars were actually taught as described. The most common type, with the largest number of students, was the survey course--General Literature, British Literature, Modern Literature and these courses provided the bulk of our sample. (See Table 3.35).

A rather interesting range of courses from university to university supplemented the survey courses. The six writing instruction courses offered included report writing, scientific and technical writing (largely remedial) and "use and abuse" of the English language in different contexts. One English department provided its first year students with a remedial English course which was essentially designed for non-degree students, with a strong emphasis on writing. Another offered a study of English and European texts in translation. The technical reading course was described as "analytical reading for information, logic and techniques of expression". Two courses were offered in English as a second language and we found one course which examined film scripts and screen plays as literature.

TABLE 3.35

UNIVERSITY ENGLISH YEAR 1
COURSES IN THE SAMPLE

Nature of Course	Courses Offered	Courses Selected
General literature survey	11[a]	8
British literature survey	10[b]	5
Modern literature survey	9	7
North American literature survey	7[c]	2
Thematic	17[d]	2
Literary comparison in genre	5	
Literature and another discipline	2[e]	1
Writing instruction	6[f]	1
Year 5 equivalent	1[g]	
(Technical) Reading	1	
English as a second language	2	
Total	71	26

[a] 2 half-courses offered, both surveyed

[b] 1 of these courses was largely remedial in nature

[c] 1 half-course offered

[d] 9 half-courses offered, 1 surveyed

[e] 1 half-course described as year 5 equivalent offered and surveyed

[f] 2 of these courses were remedial; 1 half-course was offered and surveyed

[g] This course was entirely remedial.

2. AN HISTORICAL PERSPECTIVE

Interview data with English department chairmen provide a brief historical perspective.

There were two discernible trends in the nature of English courses offered at the Ontario universities studied. The first of these has implications chiefly for the English department, the effects of the other extend beyond it.

At the secondary school level many schools have given courses treating a particular genre, period, or author in some detail. The traditional survey course has given way to these somewhat more innovative treatments. According to some chairmen, the prospective English major, on reaching the university, sometimes lacks the overview which the survey course would have offered and he needs to make this up. For this reason, two chairmen referred to a revival of the first year survey course in recent years.

The second more far-reaching trend concerns the problem of the generally perceived low level of student competence in written English. Evidence of this perception by instructors will be presented later. Courses intended to attack this problem are being offered more widely. A few are openly described as remedial, but others have remedial aspects which are not stressed in calendar descriptions.

One university which has made a determined effort to attach the writing skills problem is using, (the chairman believes with success), a very low teacher/pupil ratio in an expository writing course. They assign one faculty member and one assistant to a group of 25 students. In 1975/6 enrolment in this course was about 600. These students were drawn from all departments and every undergraduate year. At the other extreme, another institution has no remedial program as such, but covers the need to improve deficiencies in basic writing skills by intensive tutoring of those English department students found to be weak. Pretests are being administered by some universities to detect students' deficiencies in writing skills so that the students may seek early remedial help through courses or tutorials offered by a faculty or by the English department.

3. NATURE OF THE SAMPLE

The 26 courses surveyed in the study comprise 7 percent of the total number of courses offered (71) to first year students. Of the 14 half-courses offered, 5 were surveyed. (See Table 3.35).

The most common course offered was a general literature-survey type providing, in a chronological overview, a variety of critical approaches to all genres of English literature. The British literature survey courses we selected covered literature from Anglo-Saxon times to the present (other courses in this section were less general). In the category of North American literature, we surveyed 1 of the 3 exclusively Canadian courses offered, and 1 of the 2 that dealt with both Canadian and American writings (2 consisted of American literature studies).

One university provided its incoming students with a wide range of "thematic" half-courses from which to choose. The topics included: "The Coming of Awareness", "The Myth of Icarus", "Beyond Tomorrow: Utopia or Nightmare" and "Heroes and Heroism". Both of the thematic courses surveyed dealt with this last topic.

The sample seems to represent quite adequately the courses offered at the 10 universities.

B. Factors Influencing The Teaching Of The Course

1. BACKGROUND OF INSTRUCTORS

Slightly more than half of the instructors surveyed had over 10 years' university teaching experience--6 had more than 20 years. The majority of instructors (58 percent), however, had taught their present course for less than 5 years. (See Figure 4).

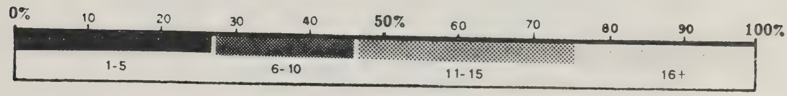
The majority of the instructors surveyed (61 percent) had no teaching experience other than their university appointment. Seven (27 percent) had taught at the secondary level, and one at elementary and secondary.

Sixty-five percent held a Ph.D. degree while the one-third remaining (9) had completed their Master's degree.

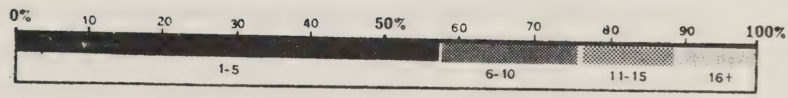
Figure 4
BACKGROUND OF INSTRUCTORS

UNIVERSITY ENGLISH YEAR 1
PERCENTAGE OF INSTRUCTORS IN EACH CATEGORY

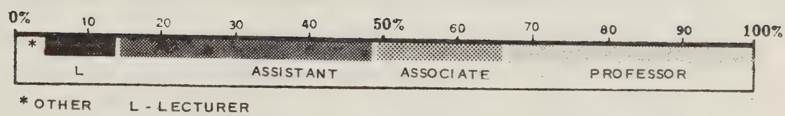
Years Teaching at University



Years Teaching this or Equivalent Course



University Rank



2. PREREQUISITES

Only three (12 percent) of the respondents claimed that year 5 English was a prerequisite to their course. English prerequisites are not mentioned in the calendars of the sampled universities. It is understood that first year students are admitted to university on the basis of completion of year 5 or its equivalent, or of year 4 in the case of special admissions. We referred to INFO, the publication of the University Information Officers' Association available to secondary school guidance departments, to find that, in general, year 5 English was required in 16[1] programs[2] (of 8 sampled universities) and strongly recommended before entry into 6 others (of 5 sampled universities).

3. CHARACTERISTICS OF INCOMING STUDENTS

(a) Variability

The overwhelming majority of university instructors (85 percent) found a large variation in the competencies of their incoming students; only 4 percent found very little. The very general information provided in this section of the questionnaire is given substance by instructors' answers to Section IV (Rating of students' level of competence at entry and exit): 36 percent of the instructors complained of the difficulty involved in rating the average level of competence when there was such great variation in incoming students' abilities.

(b) Quality of Preparation

In the general question of preparation, instructors were not very critical about the quality of preparation of their incoming students: 84 percent rated it at least fair, only 16 percent as poor. Three instructors commented that the students had such varied backgrounds that no firm, meaningful statement could be made about their degree of preparation.

[1] Three of the programs are special cases. Two programs stated that first year students required year 5 credits in two subjects out of three; one was English. Also year 5 English was required in the arts programs of another university for English majors only.

[2] Programs in which year 5 English is required or strongly recommended include all the specialized programs in 17 faculties or schools (Arts, Science, Business, Physical Education, Nursing, Music and Architecture) plus 5 single specialized programs.

Most of the instructors stated that incoming students were poorly prepared in knowledge and/or skills--most notably in writing and reading comprehension. Some commented on students' poor background in literature, history and general knowledge (4), lack of poetry appreciation (2) and inability to think critically (2). Adequate preparation in some knowledge and skills was acknowledged by 5 of the instructors, while about 40 percent declared that their incoming students were interested in learning (20 percent) and were conscientious workers (20 percent). About the same number (40 percent) stated that some attitudes were poor.

We examined another index of instructors' satisfaction with the abilities of their incoming students. This index was derived from teachers' ratings of preferred student competence in specific objectives. We have presented these data (Table 3.36) in the same form as for secondary school English.

TABLE 3.36

UNIVERSITY ENGLISH YEAR 1
PERCENTAGE RANGES OF INSTRUCTORS PREFERRING
A HIGHER LEVEL OF STUDENT COMPETENCE AT ENTRY

Topic	% Ranges of Instructors				
	81-100%	61-80%	41-60%	20-40%	∠ 20%
Literature (9)[a]	7[b]	2			
Comprehension/Analysis (3)	3				
Reading (2)		1	1		
Writing (18)	7	1	4	1	5
Oral Work (6)		3	2		1
Language (2)	1	1			
Research Techniques (2)		1	1		
Media other than Literature (2)					2
Total	18	9	8	1	8

[a]No. of subtopics in each category

[b]No. of subtopics in each % range

Over 60 percent of the university instructors preferred a higher level of student competence at entry in a total of 27 (61 percent) of the objectives. They were most dissatisfied with student competence in literature, and in some of the writing topics, especially in critical evaluation and precise logical presentation of critical arguments. They were almost as dissatisfied with inferential skills, comprehension and precision and subtlety of language use.

4. OTHER FACTORS INFLUENCING TEACHING

Teachers were asked about the influence of certain considerations upon the teaching of the surveyed course. The results are presented in Table 3.37, where, for simplicity, they have been rank-ordered. Percentages have been reported in the text where significant.

The special interest or training of the instructor and the interests of the students were the factors which most influenced the teaching of the courses: 88 percent of the respondents indicated that these factors were influential to a moderate or great extent.

It is interesting to note that a substantial proportion of the instructors claimed that the content and approach of the principal text(s) were either very important or moderately so. An assigned course outline carried some weight with half the respondents.

Respondents were asked to list their principal texts but 12 of the 26 either did not answer, wrote "not applicable" or said there were too many to list. (Numbers of texts cited ranged from 6 to 15).

Knowledge of the subject among incoming students was moderately or greatly influential for 31 percent and 27 percent respectively of the respondents; 27 percent were influenced to a small extent by this factor, the remaining 15 percent found it negligible. Considering that all respondents commented on the extent of preparation of students and all but one assigned a rating for average level of competence with reference to specific objectives, it is surprising that so few, comparatively, were greatly influenced by students' preparation before the course.

Students' future plans and their concurrent courses appeared to have very little influence on teaching. Seven instructors listed other factors.

These included collective design of the course; relationships of literature to the subject areas--biology, psychology, etc., class size, presence of Francophone students.

TABLE 3.37

UNIVERSITY ENGLISH YEAR 1
FACTORS INFLUENCING THE TEACHING OF THE COURSE

Factor	WM[a]	R[b]
Interests of students	2.4	2
Student's knowledge	1.7	4
Relationship to other courses	1.9	7
Information on student's careers, etc.	1.2	6
Ontario Ministry of Education guidelines	0.4	10
Assigned course outline	1.5	5
Special interests or training	2.5	1
Principal text(s) (Content and approach)	1.9	3
Staffing	.9	7
Other	.9	7

[a] WM= weighted mean. Each category was assigned a weighting: 0-not at all, 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b] R= rank. Factors were ranked on the basis of weighted means.

C. Characteristics Of The Course

1. *AIMS*

Instructors were asked to estimate the relative importance in their teaching of a list of general aims. We have noted the more important points below (See Table 3.38).

Two of the highest ranked aims are associated with writing and two with literature (appreciation as well as comprehension and interpretation).

Over 88 percent of the instructors (23) stated they placed a great deal of emphasis on these aims.

It is worth noting that the other two writing aims, "understanding characteristics of the language" and "enriching vocabulary", are not stressed as much as "promote fluent and grammatically acceptable written English", or ability to organize and integrate ideas and materials". Respectively, 10 (39 percent) and 9 (35 percent) instructors placed great emphasis on these other aims, less than half of the number who placed the same degree of emphasis on "promoting acceptable written English".

The attitudinal aims, "an attitude of enquiry", "self-discipline" and "respect for diverse opinions and ideas" rank high in the list of weighted means: 20 (77 percent) and 17 (65 percent) instructors indicated that more than a moderate emphasis was given to them.

The three reading aims also have a relatively high emphasis in terms of averages. The numbers who indicated more than moderate emphasis were similar to the above (18, 18, 14).

Developing "an awareness of the literary and cultural heritage of the English language" appears to be considered more important than developing "appreciation of the historical development of English literature". Fifteen (60 percent) greatly stressed the former as against 12 (46 percent) who highly emphasized the latter. This more than accommodates the number of survey courses studied.

In conclusion, a large majority of university instructors claimed their courses principally emphasized literature appreciation and writing, as well as skills associated with them: "ability to think critically" and "ability to organize and integrate ideas and materials".

TABLE 3.38

UNIVERSITY ENGLISH YEAR 1
INSTRUCTORS' EMPHASIS ON GENERAL AIMS

Aim	WM[a]	R[b]
Explore the universal elements in human experience through the study of literature	2.6	8
Develop student's ability to listen effectively	1.5	19
Develop sense of self-worth and confidence	1.7	17
Cultivate student's discrimination in reading	2.7	5
Develop respect and tolerance for diverse opinions and ideas; encourage a broader perspective	2.5	9
Promote fluent and grammatically acceptable spoken English	2.0	15
Develop appreciation of the historical development of English literature	2.0	15
Develop student's ability to organize and integrate ideas and materials	2.9	1
Develop an attitude of enquiry	2.7	5
Develop discipline to initiate a piece of work and complete it in a given time	2.4	10
Promote fluent and grammatically acceptable written English	2.9	1
Improve student's understanding of the characteristics of the language	2.2	13
Improve student's reading ability	2.7	5
Develop student's desire to read	2.4	10
Develop awareness of the literary and cultural heritage of the English language	2.4	10
Enrich the student's spoken and written vocabulary	2.1	14
Develop student's creative potential	1.7	17
Develop an appreciation of literature	2.9	1
Develop an appreciation of media other than literature	1.0	21
Develop student's ability to think critically	2.9	1
Other	1.2	20

[a]WM= weighted mean. Each category was assigned a weighting: 0-not at all, 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b]R= rank. Factors were ranked on the basis of weighted means.

2. THE OBJECTIVES OF THE COURSE

The procedure for rating the actual and preferred average level of competence of students at entry to and exit from the course is described in C.2. of Secondary School English/Anglais.

(a) Course Content

TABLE 3.39

UNIVERSITY ENGLISH YEAR 1
COVERAGE OF THE OBJECTIVES OF THE COURSE

Topic	% Ranges of Instructors				
	81-100%	61-80%	41-60%	20-40%	$\angle$ 20%
Literature (9)[a]	8[b]	1			
Comprehension/Analysis (3)	3				
Reading (2)		1	1		
Writing (18)	7	3	1	2	5
Oral Work (6)		4	1		1
Language Study (2)		1	1		
Research Techniques (2)		2			
Media (2)					2
Total	18	12	4	2	8

[a]No. of subtopics in each category
[b]No. of subtopics in each % range

Most of the objectives (30/44) were treated by over 60 percent of the instructors. It would appear that the list of objectives provided on the questionnaire permitted all of them to describe their courses, as no extra objectives were added in the space provided for this purpose. (See Table 3.39).

Eight literature topics and 7 writing topics were taught by over 80 percent of the respondents. "Evaluate written and oral critiques" was the only literature topic taught by fewer (69 percent). The high number of instructors teaching in both these areas corresponds to the high number who give literature and writing aims great emphasis.

The three comprehension and analysis objectives were also dealt with by over 80 percent of the instructors.

Project II, "Nature of Students", sheds light on the responses here. Information from 56 percent of the university instructors responding to that questionnaire gave at least moderately heavy emphasis to reading for literal understanding, and 92 percent gave similar emphasis to "reading to identify main idea or purpose". University English instructors are clearly concerned with cultivating a level of reading beyond mere literal comprehension. Most, however, appear to expect their incoming students to be competent in drawing inferences: in Project II, 92 percent gave at least moderately heavy emphasis to "drawing inferences and seeing implications", whereas 73 percent claimed, in Project III, to teach these inferential skills.

Both Projects II and III concur in their information about the emphasis on essay writing: about the same proportion of respondents (92 percent) claimed to give it at least moderately heavy emphasis in both questionnaires.

(b) University Instructors' Perceptions of Actual Average Level of Student Competence at Entry and Exit

The methods by which the data in Table 3.40 were derived are explained in the corresponding section of Secondary School English/Anglais.

The mean ratings for the average level of competence of instructors' incoming students and for that of students at termination of the course, included in Table 3.40, are based on all ratings recorded, whether or not the instructor taught the particular objective.

In the examination of the results in Table 3.40, it should be borne in mind, first, that there was a relatively small sample of university instructor responses (N=26), and secondly, that a significant number of those instructors (9, or 36 percent) found it difficult if not impossible to consider an average level of competence. (One instructor refused to fill in Section IVB of the questionnaire.) Two very experienced professors commented:

> There is a high degree of speculation (with reference to averaging) involved in my responses to all items in this question. The Questionnaire seems appropriate in most areas. The difficulty arises from attempts to average out 60 or more students. One naturally becomes more aware of the students who are not average (because of serious problems or exceptional writing and oral ability).
>
> Columns 1 and 2 may seem pessimistically low throughout because I am estimating average levels.

TABLE 3.40

UNIVERSITY ENGLISH YEAR 1
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

Objective	% Teaching[a]	% Rating[b]	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
Literature						
1. Analyze literature through an examination of its characteristics	88	88	1.8	.9	3.8	1.1
2. Analyze literature in terms of the relationship of organization to meaning	81	81	1.4	1.3	3.4	1.3
3. Identify literary genres by examination of their characteristics	85	92	1.7	1.5	3.8	1.4
4. Write a literary critique	85	85	1.4	1.0	3.8	1.3
5. Apply a critical vocabulary in the evaluation of the range, nature and quality of a particular work	92	92	1.0	1.1	3.2	1.2
6. Explain the relationship between the text and extrinsic materials (e.g., biographical, historical, mythological)	88	88	1.3	1.1	3.7	1.2
7. Analyze literary forms in terms of stylistic techniques (e.g., style, tone, form)	92	92	1.0	1.1	3.1	1.3
8. Analyze literary forms in terms of connotation (e.g., word, image, sound)	88	88	1.3	1.1	3.4	1.3
9. Evaluate written and oral critiques	69	69	2.6	1.7	3.6	1.2
Media Other Than Literature						
1. Critically assess film, television, magazines, newspapers, etc.	19	19	1.0	.7	2.8	1.0
2. Present a mass media production	4	8	1.5	.7	2.0	1.4
Comprehension/Analysis						
1. Comprehend a variety of materials (essential meaning and significant details)	88	88	2.1	1.3	4.0	1.3

[a] Percentage of instructors teaching topic.

[b] Percentage of instructors who indicated a student competence level.

TABLE 3.40 (Cont'd)

UNIVERSITY ENGLISH YEAR 1
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

Objective	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
2. Understand the subtler nuances of language (e.g., emotional connotation of words, imaginative effects of language use)	96	96	1.4	1.0	3.6	1.1
3. Distinguish between essential and non-essential information	85	88	1.9	1.0	3.5	1.3
Reading						
1. Apply inferential skills	73	77	1.4	.9	3.4	1.2
2. Apply flexibility in the speed of reading appropriate to content and purpose	54	54	1.1	1.1	3.2	1.4
Writing						
1. Support generalizations with appropriate evidence	96	96	1.4	1.0	3.8	.2
2. Write an effective sentence	81	92	1.9	1.0	3.9	1.1
3. Write an effective paragraph	85	88	1.9	1.5	3.9	1.0
Demonstrate facility in writing in terms of planning, organization, presentation and editing:						
4. essays, (expository prose)	88	88	1.8	.9	3.9	.7
5. creative writing (personal essays, descriptions, poems, short stories, etc.)	38	38	1.9	-	3.8	-
6. précis, summary and abstract	35	35	1.0	.9	3.0	1.3
7. memos	4	4	2.0	-	5.0	-
8. letters	4	4	2.0	-	5.0	-
9. reports	19	19	2.2	1.3	4.2	1.1
10. editorials	4	4	2.0	-	5.0	-
In written work:						
11. Use language in a grammatically appropriate manner	96	96	1.9	1.0	3.8	1.1

TABLE 3.40 (Cont'd)

UNIVERSITY ENGLISH YEAR 1
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

Objective	Teaching	Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
12. use words with precision	92	92	1.5	1.0	3.4	1.2
13. use words with subtlety	85	92	1.3	1.1	3.1	1.3
14. write in a style appropriate to content and audience	73	85	1.5	1.3	3.1	.9
Use language imaginatively in:						
15. poetry	19	23	1.7	1.0	3.2	.8
16. prose	62	73	1.6	.8	3.4	1.2
17. present an argument effectively	85	85	1.5	1.1	3.5	1.2
18. use effective note-taking techniques	62	65	1.8	1.0	3.7	1.0
Research						
Use research techniques effectively:						
1. use library efficiently (indexes, reference materials)	73	81	1.7	1.1	3.6	1.4
2. use appropriate conventions related to acknowledging references (e.g., footnotes, bibliography)	77	77	1.2	1.1	3.6	1.2
Oral Work						
In oral work:						
1. speak in a style appropriate to audience and subject matter.	58	65	1.8	1.4	3.5	1.8
2. use words with precision.	69	69	1.4	1.0	3.3	1.2
3. use words with subtlety.	69	69	1.0	1.1	2.8	1.2
4. present an argument effectively.	69	69	1.4	1.2	3.2	1.3
5. contribute effectively in a small group discussion.	62	65	2.2	1.1	3.8	1.4
6. participate in a dramatic performance.	12	12	1.7	.6	3.7	1.2

TABLE 3.40 (Cont'd)

UNIVERSITY ENGLISH YEAR 1
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

Objective	% Teaching	% Rating	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
Language Study						
Analyze language in terms of:						
1. grammar.	62	69	1.0	1.1	3.2	1.2
2. linguistics (origin and characteristics).	50	65	1.3	1.1	3.7	1.2

Thirdly, the mean ratings have been affected by some extremely low assessments, particularly in two English courses which serve mostly Francophone students. Only an insignificant number (2 or 3) of the entry-level ratings for objectives of these courses exceeds 1, i.e., minimal competence, on the rating scale. The data must, therefore, be interpreted with caution.

In most cases, the percentage of instructors teaching and the percentage rating each objective in Table 3.40 were about the same. However, 7 more teachers rated than taught the objective "analyze language in terms of linguistics (origins and characteristics)". This pattern most likely indicates that very few of the courses dealt with review material in order to maintain students' entry competence level. In this discussion, we will highlight only objectives treated in at least half of the courses.

The literature objectives were important in most university courses. The instructors who rated student competence at the end of those courses perceived an achievement level ranging from 3.1 to 3.8 (3.0 represents a rating of "moderate competence"). The differences in average competence from entry to exit ranged from 2.0 to 2.4 on the rating scale, with the exception of a 1.0 difference in "evaluate written and oral critiques", rated by fewer instructors (17) than other literature objectives. However, ratings varied greatly, with standard deviations above 1.0.

In the comprehension and analysis, as well as the reading objectives, the perceived average level of achievement at exit ranged from 3.2 to 4.0 (above moderate competence) with a difference in average competence from entry to exit of 1.6 to 2.2 on the rating scale. It seems that, according to the instructors' perceptions, students did not gain as much in these areas as they did in the study of literature.

The ratings of average competence at exit in the 11 writing topics taught in more than half of the universities ranged from 3.1 to 3.9 (above moderate competence) and the differences between entry and exit competence levels ranged from 1.6 to 2.4. The exit ratings varied a great deal in 6 of these writing objectives (SD over 1.0).

On the average, students seemed to improve in the ability to support generalizations with appropriate evidence (a rise of 2.4 points between entry and exit) than in any other writing objective.

Research techniques are a concern in about three-quarters of the courses. Here, students gained more competence in using bibliographic conventions (a difference of 2.4 from entry to exit) than in using the library efficiently (a difference of 1.9 from entry to exit).

Oral work and grammar were taught by fewer instructors (12 percent to 69 percent) and exit levels did not exceed 3.8 (above moderate competence).

No mean exit ratings exceeded 5 on the rating scale (competence in varied situations, some originality) but the variability in many objectives was high.

(c) General Organization of the Course including Time Allocations

We are now aware of the course aims emphasized by most university instructors; in particular, literature appreciation and writing. We also know which specific objectives instructors claimed to treat in their course; that is, 8 of the literature objectives and 7 writing and reading objectives were taught by over 80 percent.

An essential part of the data contributes to our knowledge about the amount of class time spent on certain broad topics, and the approach taken in the study of literature.

The amount of formal instruction time, broadly interpreted as class time or student-teacher contact time, is reported in Table 3.41. Anticipating that respondents would find it difficult to think of language skills in terms of separate time units, we did not itemize writing, speaking and reading.

TABLE 3.41

UNIVERSITY ENGLISH YEAR 1
TIME ALLOCATIONS

Topic	% Ranges of Total Course Time Allocated						
	0%	1-10%	11-20%	21-40%	41-50%	51-60%	61-100%
Literature				8%[a]	8%	8%	76%
Media: Critical Assessment	81%	11%	8%				
Media: Production	96	4					
Language Skills	12	38	15	27	8		

[a]% of teachers in each category

There was more formal instruction time devoted to literature than to anything else. We note that 76 percent of the instructors (20) devoted more than 60 percent of their class time to literature, the remaining 24 percent spending no less than 30 to 60 percent of their time on it. No more than 5 courses devoted any time to media other than literature. Language skills, although more popular than media studies, were not as much a part of formal instruction as literature. The majority of the instructors (20) devoted 40 percent or less of their class time to language skill development, 2 devoted almost half of their course time to it and 3 spent no time on it at all.

(d) Main Approaches to Literature

The majority of the instructors (13) declared they used a variety of approaches to the course, and 10 (40 percent) chose a study of ideas and concepts as their second approach. The second most popular main approach was historical employed by 3 respondents. We know from the calendar and interview data that most courses in our study were survey courses, described as having an historical approach but also dealing with genres and/or form and style (see Table 3.35). From questionnaire data and from information gathered concerning the instructors' second choice for a main approach, we know that a total of 7 (28 percent) of the respondents favoured studies of genres, form and style, modes, themes, ideas and concepts, and culture or country as possible main approaches.

According to Table 3.42, of the two most popular genres studied at this level, short stories enjoyed a slight edge over novels. Eighteen of the instructors devoted more than 20 percent of their time to the former, 16 to the latter. The majority of both (36-40 percent) spent between 21 to 40 percent of course time on these two genres.

Almost as popular was the study of plays, with 60 percent of the instructors spending 11 to 50 percent of their class time on this genre.

Essays and poems were the least popular of the five genres mentioned. The small amount of time that 9 of the instructors spent studying poetry corroborates earlier evidence that there was only one poetry course in the survey.

Literature before 1900 enjoyed slightly more attention than did twentieth-century literature: 20 percent more instructors spent over four-fifths of their class time on work before 1900. British literature was, by far, the most widely studied: 60 percent of the instructors (15) spent more than half their course time on it. American literature came second, although no more than half of the course time was devoted to it by any instructor. With the exception of three courses, less than one-fifth of course time was spent on Canadian literature (11 courses, 44 percent) and even less time (1 to 10 percent) was devoted to literature in translation (6 courses).

3. *TEACHING METHODS*

(a) Instructional Techniques

University instructors were asked to assign a certain percentage of in-class time to the various methods of instruction which they had utilized in their course.

TABLE 3.42

UNIVERSITY ENGLISH YEAR 1
TIME ALLOCATED TO LITERARY GENRES AND PERIODS
AND TO NATIONAL LITERATURES

Genre/Period/National Literatures	% Ranges of Total Course Time Allocated					
	0%	1-10%	11-20%	21-40%	41-50%	51-100%
Genres						
Essays	64%[a]	24%	8%	4%		
Novels	16	12	8	40	12	12
Plays	24	16	28	28	4	
Poems	64	24	12			
Short Stories	12	8	12	36	16	16
Other	84			8		8
Periods						
Before 1900	12	8	8	12	12	48
Twentieth Century	8	12	20	8	8	44
National Literatures						
Canadian	44	28	16	4	4	4
American	36	16	12	20	16	
British	8			16	16	60
Literature in translation	64	24	8	4		

[a]% of teachers in each category

TABLE 3.43

UNIVERSITY ENGLISH YEAR 1
TEACHING METHODS

Method	% Using For % Range of Time			
	0%	1-20%	21-50%	51%+
Lecture	8%	20%	36%	36%
Socratic	23	23	27	27
Small Group Activities	8	11	4	
Seminars, Tutorials	50	19	31	
Student Presentation	77	23		
Testing	38	62		
Audiovisual	73	27		
Field Trips	92	8		
Dramatic Presentation	92	8		

From the data, it is obvious that first year university English teachers employ two types of teaching methodology, the lecture and the Socratic method. Very few of what may be termed the "practical" methods of instruction such as field trips, audiovisual and student and dramatic presentations were employed. In half the courses in which seminars and tutorials were used, an appreciable number (62 percent) used them for 21 to 50 percent of the time.

(b) Out-of-Class Work

University instructors were asked to estimate the average out-of-class time students spent on their course assignment. The majority of first year instructors (76 percent) expected over one and a half hours out of class for every hour spent in class.

(c) Provision for Individual Progress

Sixty-five percent of instructors made no provision at all for individual rates of progress in their courses. Of the remainder, 5 thought that a small degree of individualization was possible, and 3 thought there was room for a moderate amount. Only one thought that the course taught was to a great extent individualized.

(d) Teaching Resources

Table 10 reports the extent to which various resources were employed in courses.

TABLE 3.44

UNIVERSITY ENGLISH YEAR 1
TEACHING RESOURCES

Resource	Use by % of Instructors				
	N/A	Not at all	Small	Moderate	Great
Main text	27%	8%	4%		61%
Main text plus supplementary text	33	8	13	29	17
Two or more main texts	8	20	8	8	56
Reference books		4	58	27	11
Documents, journals, scholarly reviews	4	36	36	20	4
Other classroom resources	12	68	20		
Audiovisual media	8	67	25		
Mimeographed material	4	42	42	12	

University instructors reported that they favoured one or more main texts as the basic resource in their classroom. Other resources, if used, served as supplementary material. The one instructor using the "other" category specified that 15 primary texts were used.

4. ASSESSMENT OF STUDENT WORK

(a) Exemption from Final Examinations

Most of the English instructors (76 percent) declared the final examination was compulsory. Among the 16 percent who indicated that students could be exempted, conditions for exemption included successful completion of assigned papers and term tests. One course had no final examination.

A few university instructors and chairmen commented that they were forced to place less emphasis on term work because of the extent to which students plagiarize material. One assistant professor of 12 years experience commented,

> In order to maintain standards and to gain a more accurate evaluation of the student's ability there is an increasing tendency to de-emphasize the value of essays when computing the final grade and allotting the majority of marks for controlled writing situations (tests, exams) in which the possibility for cheating or dishonesty is minimized. It is unfortunate that this expedient measure is contrary to the principle of scholarship which should encourage the ideas of curiosity, inquiry, study, and the organization of clear and correct dissemination of knowledge.

Respondents were asked to estimate the percentage of students' final mark (or grade, e.g., pass/fail, letter grade) normally allocated to types of assessment procedures.

TABLE 3.45

UNIVERSITY ENGLISH YEAR 1
FINAL MARK ALLOCATION

Item	Allocation of Final Mark (by % ranges)				
	0%	1-10%	11-30%	31-40%	41%+
Final Examination[a]	8%[b]		38	46%	8
Mid-term Examination	42	8%	50		
Other Written Tests	58	15	19	4	4
Other Oral Tests	84	8	4	4	
Individual Papers, Essays, etc.	14	4	24	31	27
Class Participation	42	50	8		
Effort	77	23			
Attendance	88	12			
Individual Oral Presentations	88	4	8		
Other	96	4			

[a] When respondents indicated that students could be exempted from their final examinations, the final mark allocation was determined by excluding marks assigned for the final examination. When all students were required to write the final examination it was included in the final mark allocation.

[b] % of instructors in each % range

The data in Table 3.45 illustrate a decided preference for two types of assessment, the final examination and individual papers. We should note here that individual papers were given a weight of over 40 percent of the final mark by more than a quarter of the respondents.

In order to clarify the data on methods of evaluation, we examined course outlines and examinations from 5 universities.

The proportion of the final mark assigned for term work varied considerably. The lightest appeared to be one term paper and an unspecified number of in-class essays. The heaviest required four essays, 1,500 words in length, and one or two class presentations in seminars. Ten courses reported 2 or 3 essays, and thus ranked in the average group.

Twelve term papers and 31 final examinations from 1975/6 courses were examined. Four term papers were two hours long, and the rest specified a three-hour duration, perhaps as preparation for the three-hour finals to which all courses but one were leading. Some examiners divided the examination in terms of time allotment--one hour per question. Others tended to distribute their marks among questions in even fractions of the total; that is, 2 questions worth 50 percent, 4 worth 25 percent, etc. Thirty-nine of the 43 papers used, or were completely composed of, essay answers that appeared to be based on comments about textual material. Twenty-one papers chose extracts from texts for explication, the same number used sight passages in poetry and one examination allowed 10 percent of the total mark for writing style.

D. Discussion

In most universities, a first year English course enrols students intending to specialize in a variety of university programs. Since secondary school year 5 English was not a requirement for entering all programs at the ten sampled universities and most of the respondents (88 percent) claimed no prerequisites existed for their surveyed course, it is not surprising that first year university English instructors (85 percent) found a great deal of variation in their incoming students.

This high degree of variability is also attributable to the varying secondary school backgrounds in English of a large number of first year university students.

Over a third (36 percent) of the respondents, almost half (42 percent) of whom had taught the course for over 5 years, expressed some difficulty in rating the average level of students' competence at entry to and exit from the course and the ratings were widely spread from the mean. Nevertheless, the mean entry level ratings assigned were very low to low--closer to "minimal competence" than to "moderate competence". It is significant that despite these low entry level ratings comparatively few instructors (50 percent) said their teaching was influenced by incoming students' knowledge of English.

More formal instruction time was devoted to literature than to any other area and most instructors (82 percent) were dissatisfied with the average level of students' competence in literature skills at entry to their courses. (In fact, 54 percent of them were highly dissatisfied). Over half of them were dissatisfied with the entry level of competence in language skills. Little formal time was spent on language skill development and yet instructors claimed that high emphasis was placed on corresponding aims. One explanation for this anomaly is that instructors feel strongly that language skills are essential to the study of literature and they are sensitive to the public pressure about students' deficiencies in basic skills, particularly as expressed by the press. It seems that instructors' responses reflect their expectations rather than the actual emphasis they placed on language aims in their teaching.

The mean exit ratings of average level of students' competence in objectives taught by over half of the instructors did not exceed 4.0 (between "moderate competence" and "competence with originality, in varied situations"). Of course, because of the high variability some ratings were assigned close to 5.0, "competence with originality". But the upper part of the rating scale, between 4 and 7, was used by very few respondents.

It appears then that when students' preparation in language skills is perceived as low and competence at exit not very high (just above "moderate competence"), then more attention needs to be paid to the development of language skills in first year university English courses.

The Year 4 Secondary-Year 1 College Interface

The student population in a first semester college English course is heterogeneous: most students are graduates, with 4G English credits, from many different Ontario secondary schools. But some have 4A English or year 5 English credits; some have the equivalent of a year 4 secondary school diploma without a year 4 English course and some do not speak English as a first language. It is, therefore, not surprising that most college instructors (87 percent) found a great deal of variation in the competencies of their incoming students. Even the 4G and 4A courses within the secondary schools appeared to have heterogeneity: a large percentage of 4G (82 percent) and 4A (65 percent) teachers perceived a high degree of variation among their students.

In the year 4 secondary school and college courses where aims might be expected to be generally congruent we see some striking dissimilarities. Where year 4 teachers emphasized "the universal elements in human experience through the study of literature" and "appreciation of literature", the college teachers of primarily first semester courses considered that aspect of English as very unimportant. Granted, those of second semester courses probably placed more emphasis on literature. The 4G teachers, many who may also teach 4A students who mostly continue to year 5, could have been influenced by the literature aims of 4A courses or other academic classes or by peers who teach advanced courses.

Most of the year 4 and college teachers (over 60 percent) expressed a preference for a higher entry level of competence (in most objectives) than they perceived their students actually to have attained. In fact, about a third to a half of the year 4 teachers and college instructors were highly dissatisfied regarding the competence level of their incoming students in most objectives.

In general, reading and essay writing appear to be the areas in which teachers at both levels claimed most improvement was needed.

In the secondary school-university interface discussion, we referred to the consistently negative attitude on the part of instructors at any level assessing the level of preparation of their incoming students. The same principle applies at the secondary school-college interface.

The separate Rating Validation analysis showed that the 4G teachers tended to rate the average level of student competence half a point higher than the college instructors, while the 4A teacher ratings were approximately the same as those of college instructors. All eleven items in the Rating Validation instrument were students' literature essay answers. Even though it was noted earlier that literature objectives were treated in less than 28 percent of the first semester college courses, the skills involved in answering literature essay questions are also writing, comprehension and, to a certain extent, inferential skills. It could be argued that 4A teachers with presumably a more academic approach than 4G teachers assess students' skills in much the same way as post-secondary instructors.

Since the majority of first year college students are secondary school graduates with 4G English credits, it is more important to compare the competence ratings of 4G teachers with those of college instructors than those of 4A teachers with those of the latter group. Even if we use the Rating Validation data to adjust the ratings which 4G teachers gave to represent the average level of student competence (+.5), differences in ratings of 4G teachers and college instructors still exist (ranging from .4 to 1.3 points equivalent to those on the questionnaire rating scale). The differences between 4A and college instructor ratings are much greater (ranging from 1.5 to 2.9).

We should bear in mind the tendency for instructors to be overly critical regarding the level of competence of incoming students before we conclude with any degree of accuracy that college respondents have a lower opinion of the skills of year 4 graduates than do year 4 teachers. Since more time is spent in year 4

courses on literature, they probably do not prepare students in the development of language skills to the level desired by first semester college instructors.

The perceptions of college instructors about the variation in student abilities and the diversity of student population in college English courses have made it essential for the colleges to retain a variety of procedures to accommodate the tremendous differences in the abilities of incoming students.

The Year 5 Secondary - Year 1 University Interface

English is not a discipline in which one can precisely identify gaps and duplications at the year 5-first year university interface--firstly, because of the similarity of content at both levels, and secondly, because of the nature of the discipline. At the senior secondary school and university levels, the study of English is not seen as isolated increments of language and literature skills. Instructors at both levels considered that the teaching of literature was the prime subject matter in their courses. (Close to 80 percent treated at least 8 of the 9 literature objectives and 85 percent taught literature over half of the time). The main approach to language development, particularly in the first year university English is expressed in the following quotation:

> literature is important as the greatest of arts, as man's most searching and profound means of exploring himself and his cosmos, and...a proper command of the language that is the medium of literature can only be be gained by close study of its use in literature. *

Most teachers at both levels placed high emphasis on the aim, "promote fluent and grammatically acceptable written English", and claimed they treated the same objectives related to writing.

*Priestly and Kerpneck, the A.C.U.T.E. study, preliminary report May, 1976. (Final report due December, 1976.)

However, despite the difficulty found in determining the specific weight allocated to formal instruction for development of language skills since language study is so intrinsically related to literature study, respondents indicated that considerably less time was devoted to language skill development than to literature. (Less than 40 percent of the time by most (92 percent) year 5 teachers and less than 20 percent of the time or no time by most (65 percent) university instructors). It should be noted that with the advent of the secondary school credit system the number of language/composition periods was reduced from three to one per week in most senior English courses.

At both levels teachers were highly critical of the preparation of their incoming students. Granted, the majority of year 5 teachers (58 percent) and first year university instructors (85 percent) also perceived a great deal of variation among incoming students. At least secondary school teachers find some degree of homogeneity in their groups of incoming students in comparison to the pronounced variability found in first year university courses: students with varying backgrounds in the study of English enter from many different secondary schools. Nevertheless, over 70 percent of the year 5 teachers expressed particular dissatisfaction about their incoming students' preparation in the same objectives taught in university courses; about the same percentage of university instructors (68 percent) preferred a higher level of student competence at entry. In fact, between a quarter to a half of both the year 5 teachers and university instructors were highly dissatisfied with their students' entry level of competence in their principal objectives.

Teachers at any level receiving students into a course tend to be extremely negative about the competencies of their incoming students. We found that in checking the entry level ratings of year 5 English teachers against 4A exit ratings, differences ranged from .8 to 1.3 points on the scale showing that year 5 teachers tend to assess their incoming students more severely than 4A teachers assess the same students at the end of their courses. This evidence strongly suggests

that we must interpret with caution strong negative generalizations which instructors at the next institutional level make about the preparation of students. If teachers at different year levels in secondary schools disagree in their assessment of students (our data prove that marks assigned to secondary school students vary quite considerably--see King, 1973), then, first year instructors at university would most likely disagree to even a greater extent.

University instructors perceived a much lower average level of competence of incoming students than that perceived by year 5 teachers at the end of their course. (The differences in means range from 1.6 to 3.0). Even if we discount a .5 difference accounted for in the Rating Validation analysis*, the difference in perceptions of university and year 5 teachers remains substantial.

It appears then that, even if we bear in mind the tendency for any instructors to perceive the level of competence of incoming students negatively, those of the first year university courses have a much lower opinion of the English abilities of year 5 graduates than do year 5 secondary school teachers. If student competence is indeed as poor as university instructors perceive it to be, until such time as the situation is ameliorated, more remedial opportunities should be provided in first year university English courses.

If we are to consider the question of gaps or duplications in English teaching at both levels we must understand the nature of English learning. Language acquirement is a long-term, reinforcing process and must be considered in its developmental context. Reinforcement is fundamental to language learning and some degree of duplication at both institutional levels is essential; however, duplication should not happen to the extent that inefficiency in the system evolves.

*As a supplementary check on the validity and reliability of ratings, the Rating Validation instrument was designed and administered to the year 5 and university respondents. The items comprised 11 student answers to literature essay questions which had to be marked in terms of content and writing style. Analysis of results, described in Volume 2 showed that correlation between items was low and about a half point difference existed on every item between year 5 teachers' use of the rating scale and that of university instructors. The latter group tended consistently to rate the student answer lower than the former.

The question remains: "Is there sufficient duplication in language to develop and maintain student competence in those skills?"

With regard to duplication in literature skills--so linked with those of language development--most secondary and university teachers teach the literature skills mentioned; nevertheless, the degree of student competence as perceived by teachers at both levels differs. We have been unable to delve deeply into the subject matter of literature because of its complexity. Literature skills and the level of competence required at each level need to be further defined; and coordination across institutional levels should exist in order to accomplish that mammoth task.

To be sure, gaps in the secondary school teaching of most of the topics are perceived by most university instructors. (This perception is in accordance with the general feeling of discontent about language skills prevalent across the country). But the gaps that need to be scrutinized are those which may exist in the language development of the student.

The Anglais Interface

One of the aims specified in the Anglais K-13 guideline is that students should be prepared to continue their studies in English at the university level. Most (99 percent) Ontario secondary school students graduating with Anglais courses are easily able to pass the proficiency test administered at the one university which offers Anglais courses. We cannot, therefore, in dealing with Anglais truly speak of an interface.

At another bilingual university, according to one representative, provision is made in first year for a basic English skills course for all students desiring such a course. (It is not counted as a credit for an English major, but is added to credits for a degree). Students in all professional faculties are encouraged to take this course. There is no special ESL component designed for the Francophone students in the many sections offered; only a small number of Francophone students appear as candidates for any remedial treatment.

It would seem, then, that although Anglais (ESL) courses exist at the university level, they mostly serve Quebec, rather than Franco-Ontarian, students. The fact still remains that secondary school year 5 Anglais teachers perceived that their students were only, on the average, moderately competent in English skills. It will be interesting to compare these perceptions to the actual achievement of students on Project II tests.

We consider that Project III of the Interface study has merely scraped the surface in exposing Anglais secondary school curriculum areas in need of closer investigation.

The final report on the longitudinal study* concerned with the needs of Franco-Ontarian students should contribute a relevant perspective toward the further examination of specific objectives of the Anglais curriculum.

*Ellis, Dormer and Fleming, W. G. 1972/5. A study of the characteristics and needs of Franco-Ontarian Children in the Ontario Educational System. Interim reports to the Ministry of Education.

4 French

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SECONDARY SCHOOL FRENCH YEAR 5

A. The Sample

The interface for French as a second language has, in this study, been considered in relation to the courses offered in year 5 and at the first year in the universities. Fifty-one courses were studied, representing 50 different schools, selected as outlined in Methodology.

After each school had been chosen, the year 5 French course which best represented the interface with post-secondary education was selected. In schools where only a single course was offered this required no selective judgement. In schools where more than one course could be considered an "interface" course, a basic course was selected rather than an advanced or second-credit course for which the basic one was a corequisite. In the few instances where two parallel courses existed, the one with the larger enrolment was used. In one school which specialized in senior work, two of the year five French courses were included.

To see the sample in the context of all the courses offered in these schools the student handbooks for the schools were reviewed and the appropriate courses were analyzed according to their stated pre or corequisites, and their apparent emphasis on each of six topic areas: grammar, writing, translation, conversation, literature and culture.

Course descriptions are usually both brief and cryptic. Their interpretation requires some inference, and provides for some subjective variation. The analyses reported are, therefore, used only to sketch a general picture. It is, however, one which we feel is accurate enough to permit some useful comparison with the detailed analyses developed from the course description questionnaires which form the backbone of this study and with the comparable analyses of university courses.

In summary, these schools and the Year 5 French courses they offer may be categorized as follows:

	No. of Schools
Offering a single year 5 French course only	18
Giving two French courses at different levels with a basic course as a prerequisite for the advanced	10
Listing two French courses at different levels but giving only one	5
Giving two distinct courses at approximately the same level	9
Listing two courses at approximately the same level but giving only one	8

This gave us a total of 82 courses - 69 actually given and 13 that might be described as "ghost" courses, but that were included in our analyses of course outlines. From these 69 we selected the final sample of 51. These were not selected on the basis of the content analysis shown here; nevertheless, the distribution of responses given in the tables which follow supports the view that the sample studied was representative of the range of courses available.

The analysis of these 82 course outlines in relation to their emphasis on grammar, writing, translation, conversation, literature and culture revealed only 9 that indicated any work in translation, and none of these gave it much emphasis. The category was accordingly dropped from the analysis, and the courses were sorted as follows:

(1)	general courses with significant emphasis on each of the sections listed above	39
(2)	courses with heavy emphasis on grammar and writing	2
(3)	courses emphasizing conversation in French	25
(4)	courses emphasizing literature and culture	16

This list, however approximate the classification, suggests certain trends which were repeatedly mentioned in interviews with heads of French departments and which would, we believe, be accepted by most teachers of French who have been in the system for the past ten years. These trends may be outlined as follows:

1. About half of the courses have continued in a traditional "balanced program" mode.

2. There has been a reduction in the attention paid to grammar, writing and translation.

3. Conversational French (i.e. aural/oral) has increased in relative importance in the stated objectives of the courses.

4. The number of courses which have utilized the increased freedom of recent years to become heavily "literary" has increased.

This brief review of the total offerings of the 50 schools studied provides a background against which the detailed descriptive analyses of 51 courses can be set.

B. Factors Influencing the Teaching of Courses

1. *BACKGROUND OF THE INSTRUCTORS*

The respondents were an experienced group. Nearly 70 percent had ten years or more of secondary school teaching experience, the average being about 14 years. Nearly half had been teaching "this course" for 8 years or more; the average was 9 years teaching it or its approximate equivalent. This can, of course, also be read to indicate that only half had taught French in year 5 during the period when there were external examinations. All teachers rated the course as being in their area of specialization or very close to it.

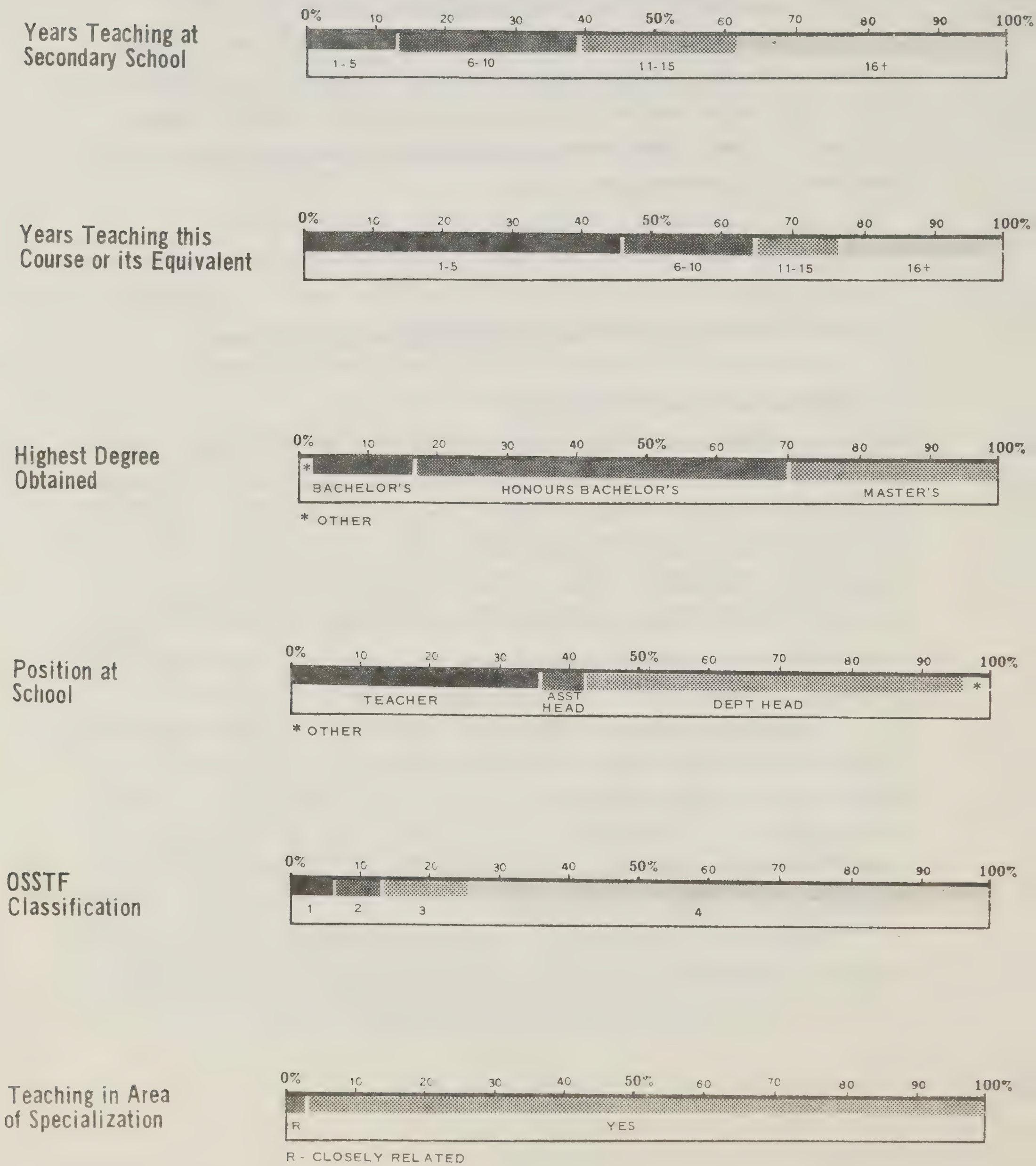
Eighty-four percent held either a Master's or Honours Bachelor's degree. With so many having done advanced work, it was not surprising that a considerable number (10 percent) had taught at college or university. In addition, 12 percent had taught at the elementary level. It was consistent with these data that 76 percent were at level 4 of the OSSTF certification.

The general picture is of a group who were highly trained and highly experienced both in the time they had been involved in teaching year 5 French and in the significant exposure they had had

Figure 5

BACKGROUND OF TEACHERS

SECONDARY SCHOOL FRENCH YEAR 5
PERCENTAGE OF TEACHERS IN EACH CATEGORY



collectively to teaching at other levels. Since, in addition, over 50 percent were department heads they should be able to speak with authority for the teaching of French in our secondary schools and might be expected to have some knowledge of what is taught in the universities.

2. *PREREQUISITES OF THE COURSE*

Of the 51 courses studied the vast majority (88 percent) required the completion of at least a year 4 course, and only two courses (4 percent) had no prerequisite (8 percent did not reply to this question).

There can be no doubt that the teachers of French at year 5 level consider that several years training in French is mandatory - in short, that the various levels of French courses should follow a hierarchical pattern.

Corequisites are required for many of the more advanced French courses offered by the schools surveyed, but these more advanced courses were in general excluded from this study in favor of the larger 'basic' year 5 French courses.

3. *CHARACTERISTICS OF INCOMING STUDENTS*

Under this heading we deal with the variability of students as they enter year 5 French courses, and specific issues in the quality of preparation in year 4 as revealed by the extent to which teachers are "satisfied" or "dissatisfied" with students' level of preparation.

Teachers almost universally stated that students entering their classes are very variable in their levels of achievement. Sixty-five percent of respondents said their classes showed a great deal of variation; an additional 30 percent considered they showed a moderate amount, and only 4 percent considered that there was little variation. Variability was most often related to basic skills, although knowledge ran a strong second.

More detail for interpretation of these comments on variation is available from the section of the descriptive questionnaire that deals with levels of achievement. Teachers were asked to indicate, for each

TABLE 4.1

SECONDARY SCHOOL FRENCH YEAR 5
PERCENTAGE OF TEACHERS PREFERRING A HIGHER
LEVEL OF STUDENT COMPETENCE AT ENTRY TO YEAR 5

	Topic area	% of teachers	No reply
1.	Grammar - basic morphology and syntax	61%	2%
2.	Grammar - conjugation of all regular and auxiliary verbs	71	4
3.	Grammar - common tenses and moods	65	4
4.	Ability to apply grammar in writing and in speaking	84	2
5.	Ability to express ideas clearly and correctly in written French	86	2
6.	Skill in translation - English to French	73	14
7.	Skill in translation - French to English	49	22
8.	Vocabulary - general	69	2
9.	Vocabulary - idiomatic expressions	69	2
10.	Vocabulary - Canadianisms	61	16
11.	Reading comprehension	69	4
12.	Aural comprehension	61	6
13.	Fluency in spoken French	69	2
14.	Literary history	47	22
15.	Concepts of literary criticism	41	28
16.	Vocabulary of literary criticism	37	28
17.	Understanding of cultural differences and similarities	63	4

of 17 topic areas, the level at which their students entered and also the level at which they would have liked them to enter. The difference between these levels represents some measure of their degree of satisfaction with students' preparation in each topic area.

Table 4.1 summarizes this part of the survey. The basis for the rating of levels of achievement was a scale of 0 (no competence) to 4 (mastery). If a teacher reported students entered at level 1 (minimal competence) whereas level 2 (moderate competence or higher) was preferred, he or she was classified as being dissatisfied. Teachers for whom the level found and the level preferred were the same were, of course, considered satisfied. The "no reply" category covers all those teachers who omitted one or other of the entry or exit levels so that a difference reading was impossible.

It is clear that there is a very significant level of dissatisfaction in the levels of achievement of incoming students. This is most sharply expressed in the application of grammar in precise speech or writing, in grammar itself and in translation into French. While this does not bear directly on the issue of variation it suggests that variation should be looked at with special care in these topic areas.

The rather high measure of dissatisfaction with the items toward the end of the table probably reflects differences in opinion on what is important rather than any real inadequacy of preparation. Evidence in support of this view is available from later discussions of topics given emphasis by all teachers or by only a relatively small number.

4. *OTHER FACTORS INFLUENCING TEACHING*

Teachers were invited to respond to a list of nine specified factors which might be important influences on their course design and teaching. These nine are listed in Table 4.2, together with the percentage of respondents who gave no, small to moderate, or major weight to each factor.

TABLE 4.2

SECONDARY SCHOOL FRENCH YEAR 5
FACTORS INFLUENCING THE TEACHING OF THE COURSE

Factor	% of Teachers Responding			
	Not at all	Small to moderate	Great Extent	N/A
Interests of students	2%	51%	47%	0%
Students' knowledge	8	39	51	2
Relationships to concurrent courses	29	53	12	6
Information on students' future plans	25	55	18	2
Ontario Ministry of Education guidelines	14	55	31	0
Assigned course outline	33	24	27	16
Teachers' special interests and training	8	51	41	0
Principal text	10	37	51	2
Staffing	39	16	12	33

Few teachers found it necessary to use the "other" category, and the Table 4.2 list may be considered to have covered the issues of course design adequately.

The table reflects upon the issue of variability already discussed (it will surface again in relation to the universities) and to issues of coordination discussed in another section. Some considerable freedom to develop one's own course clearly exists within a central range of "small to moderate" weight on any one factor. The significant numbers giving no weight or alternatively heavy weighting to such factors as knowledge of incoming students, future plans of students, and Ministry guidelines will be surprising, at least to those who would argue that course design is centered squarely between where the student is on entry and where he has to be on exit.

Clearly the table suggests that the process of course development is far from standardized.

C. Characteristics of the Course

The principal source of information about courses, how they are taught, standards, methods of evaluation, etc. was the course description questionnaire. The method used to design the questions is described in the section on Methodology and the actual questionnaire appears in Volume 2, where results are also tabulated. Here, the most significant data derived from the questionnaire are summarized.

1. AIMS OF THE COURSE

A list of 14 general aims considered by the committee which designed the questionnaire as being likely to encompass the aims of a year 5 French course was offered to the respondents and they were asked to indicate what degree of emphasis they gave to each (see Table 4.3).

TABLE 4.3

SECONDARY SCHOOL FRENCH YEAR 5
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	% of Teachers Responding				
	None	Little	Moderate	Heavy	N/A
1. Skill in reading	0%	2%	51%	47%	0%
2. Skill in writing	0	0	33	67	0
3. Aural comprehension	0	6	16	78	0
4. Skill in speaking	0	0	18	82	0
5. Knowledge of literary history	29	57	14	0	0
6. Sensitivity to beauty and elegance in language	10	37	39	14	0
7. Appreciation of and sensitivity to cultural variety	4	26	39	31	0
8. Application of techniques of literary criticism	39	51	8	0	2
9. Appreciation of language as a medium of human thought	4	26	41	29	0
10. Interest in language studies	4	33	41	22	0
11. Respect for precision of expression (oral and/or written)	2	0	33	65	0
12. Self-confidence in French	0	0	29	71	0
13. Self-reliance	2	12	45	39	2
14. Understanding of self	18	33	24	23	2

Again, the fact that no teacher required the "other" category in order to describe his or her course implies that the range of aims was adequate. The emphasis on various aims may be compared, in general terms, with the summary of course descriptions from student handbooks provided earlier. It appears that the emphasis on writing is higher than would be estimated from reading the course descriptions. The emphasis on formal aural/oral French is also clear. However, it must be noted that this table gives only very approximate statements of emphasis. The time allocation analysis, which comes later, provides a somewhat better basis, but even it is hard to interpret because many aims are pursued through a single activity.

What is clear from this table is that even if about half the courses continue in what we have called a "balanced traditional" form, there is room within the range of emphases here for a good deal of heterogeneity. For example, one teacher in seven gives moderate emphasis to literary history and the rest do not. About two-thirds of the teachers stress the appreciation of cultural variety, whereas one-third do not. The significance of the language-human thought relation is seen as important by many teachers but as either unimportant or unrealistic by a large number. Teachers differ widely on the degree to which they attempt to develop such qualities in their students. In brief, this survey of emphases gives a picture which fits fairly well with that from the analysis of student handbook descriptions and appears to represent courses which cover the subject from a considerable number of points of view.

2. *OBJECTIVES, LEVELS OF ACHIEVEMENT, AND TIME ALLOCATION*

In a study of the way in which courses at one level may overlap with one another or have substantial gaps in coverage (i.e., in the way in which courses at one level prepare students for courses at a higher level) it is desirable to consider both what is covered in each course and the level at which it is handled.

The rationale for a rating of levels is provided in the Methodology. Teachers of French at year 5 and in first year university were asked to rate the average level of competence of students on entering their course and on exit in 17 topic areas. The differences between these values indicate the amount of progress the teacher thought the class achieved in that topic area, and the teacher's perception of the level at exit can be compared with the university instructor's perception of the level at entry to university. Teachers were also invited to indicate the preferred level at entry. The differences between the actual and preferred level were used in an earlier section as a measure of satisfaction with the preparation of students in that area. The time allocation will be considered in relation to these satisfaction levels and to the general aims discussed in the previous section. Topic time allocation and topic coverage will not be discussed in detail here, since these data form a principal basis for the interface comparisons which will be considered later. However, it is worth noting that the time given to translation, while modest, was more than might have been expected from the student handbook descriptions, whereas the concentration on aural/oral is less. The time allocation data also allow one to place the aims data in better perspective. It is, however, virtually impossible to translate the topics/content list directly into the aims list, or vice versa.

3. *TEACHING METHODS*

Variation in the way in which courses were taught was studied in relation to three variables: the time spent on each of 15 types of classroom activity (Table 4.4); the amount of homework expected, as a percentage of scheduled class time; and the extent of use of 12 different types of classroom instructional resources (Table 4.5).

TABLE 4.4

SECONDARY SCHOOL FRENCH YEAR 5
TEACHING METHODS

Method	% of Teachers Using for % Range of Time			
	Not at all	1-10%	11-20%	20+%
Dictation	24%	74%	2%	0%
Translation by students	22	55	23	0
Language laboratory	80	20	0	0
Lecture	29	51	18	2
Socratic	4	4	25	67
Small group activities	37	47	10	6
Seminar, tutorial	45	35	10	10
Classroom study	33	67	0	0
Individualized instruction	86	14	0	0
Student presentation	23	63	14	0
Testing	6	69	23	2
Audiovisual	14	76	8	2
Field trips, visitors	65	35	0	0
Dramatic presentations	47	51	2	0
Other	82	14	4	0

The most widely used method is the Socratic, with question and response in the aural/oral mode; this provides for many courses, the major experience in oral expression. The other major techniques were testing, translations, and audio-visual in that order, with the bulk of the other methods not far behind these major ones in weight.

In general the picture is of each teacher using a wide range of methods. Few methods were used for more than 10 percent of the time. However, it is worth considering the relative sizes of the "use" and "do not use" pools for each. In all but two cases - Socratic and testing - there is at least a 15 percent group on each side of this line. This represents a rather wider variation than one might have expected, though a considerable range of styles and approaches is not unexpected in a group of 51 teachers.

In the matter of homework the variability in the demands on the out-of-class time of students is striking. Only 14 percent of teachers expected less than 30 minutes for each hour of class time; nearly one-quarter expected between 30 and 45 minutes and the largest number - 41 percent - between 45 minutes and one hour. No fewer than 22 percent of teachers expected over one hour's out-of-class work for each hour of class time. The level of work expected, multiplied by the number of courses a student would take, implies a heavy total load of homework. Some experienced teachers of year 5 French who were consulted on this issue felt that the above figures were in fact just "guesstimates" which were some distance from reality as they had experienced it.

Styles and methods of teaching are also indicated by the extent to which various classroom resources are used (Table 4.5).

The predominant importance of texts in the instructional process is clear from this table. Only texts, and textual materials such as reference books and lecture notes, are used by more than 20 percent of the teachers to a great extent. However, the percentages in the "do not use at all" column are fairly high for all except reference books.

TABLE 4.5

SECONDARY SCHOOL FRENCH YEAR 5
TEACHING RESOURCES

Resource	Use by % of Teachers		
	Not at all	Slight to moderate	Great
Main text	15%	14%	71%
Main text plus supp. text(s)	28	47	25
Two or more texts plus other text material	8	26	66
Simplified editions of great works	76	24	0
Works of criticism	54	46	0
Reference books, dictionaries, etc.	0	78	22
Individual learning packages	80	18	2
Magazines, newspapers, etc.	10	86	4
T.V., tapes, film strips, etc.	10	80	10
Language lab	70	27	2
Lecture notes, etc.	14	58	28
Other	96	2	2

The textbooks used covered a wide range: 17 different ones were listed by the 38 teachers who used a textbook and who provided the name. These differed appreciably in level. Two of the 51 courses studied reported using grammar texts which were considered to be in the year 3-4 range, and four others were considered more appropriate to year 4 than to year 5.

In three-quarters of the courses at least 75 percent of the instruction was given in French; only one course reported less than 30 percent. This is somewhat inconsistent with the information noted in the report given later (see interface discussion) that a mere 10 percent of total time was devoted to developing aural comprehension.

Most of the courses had to devote considerable time to "review of previous courses." About half reported up to 10 percent of their total time spent in review, a quarter spent 10-20 percent, and two teachers claimed to be spending more than 40 percent of their time in review.

Individualized instruction played only a small role in the courses reviewed. Eighty percent of respondents reported none, 16 percent reported a little, 2 percent a moderate use, and only 2 percent a great deal of individualization.

4. *ASSESSMENT OF STUDENT WORK*

Evaluation procedures are of interest in at least three ways. They provide the basis for certifying that students have achieved a certain level and for corrective feedback to the teaching process, and they provide a powerful influence on the student estimate of the importance of various parts of the course. If a topic or objective receives little attention in the evaluation process, it is likely to receive little attention from the students, regardless of the teacher's views of its importance. In addition, the examination process can be, and is in many jurisdictions, a powerful coordinating mechanism.

Detailed evaluations must be made in relation to specific objectives and hence within the context of a specific course - in other words a case-study approach is required. Such a detailed study lies outside the terms of reference of the present study, and all that will be attempted here is a tabulation of how much weight teachers give to various kinds of evaluation in calculating a final mark for each student. This tabulation shows some of the variation

in approach, and when set beside similar university data, permits a comparison of methods in secondary schools and universities.

Since this study focusses on this comparison, these tables will be presented later in the interface section and both variation within the groups and comparison of the groups of courses will be dealt with there.

D. Discussion

Building competence in a second language which is started in a major way at age ten to thirteen and carried on for 5-7 years is a cumulative process in which there should be a measure of agreement on where the student ought to be at the year 5 level - and some evaluation procedure should provide assurance that he has reached that level. However, there is clearly dissatisfaction about the heterogeneity of the students. This shows up dramatically in the section on variability of students and in the dissatisfaction with the levels achieved in many topics.

The reasons for the variation appear to be complex. The data on aims of the course show a heavy emphasis on the "core" topics of reading, writing, speaking, listening - but the high variation in time allocations and in the emphases stated in the published course prescriptions suggest that there is a good deal of difference in the teachers' perception of what level of performance in "basics" must be achieved before students can profit from excursions into more literary and cultural fields. This difference, coupled with real differences in interests and hence objectives (see comments on influences on teaching) and with the variation in the effort teachers demand, makes for an uneven set of courses from which students flow into the group of university courses to be described in the next section.

UNIVERSITY FRENCH YEAR 1

A. The Sample

The twenty courses studied at university were drawn from a total of 52 courses open to first year students in 10 institutions - an average of about 5 per institution, with a range between 13 courses at one end, and 1 at the other. The universities are offering a far wider range of French courses than are the secondary schools.

The 52 courses described in the university calendars could not be fitted conveniently into the four categories used for the year 5 courses. An expanded set of categories, which included service courses for scientists and general cultural courses, was therefore used. The courses were assigned to the six categories as follows:

	No. of Courses
1. General language courses with more or less equal attention to language, literature, conversation, etc.	20
2. Courses with heavy emphasis on grammar and writing	4
3. Courses emphasizing conversation	7
4. Courses emphasizing literature and culture	14
5. Courses in translation, e.g., for scientists, etc.	4
6. Courses in history and culture	3

Selection of courses from the pool of 52 for detailed study was related not only to this classification but also to prerequisites.

Type of Prerequisite	No. of Courses
Year 5 or equivalent	25
2-4 years secondary school French	12
Placement test or departmental permission	7
None	8

In the strictest sense, only the first group interface directly with year 5 French. The sample of courses for detailed study was,

therefore, intended to be drawn from this group. In universities where there were several courses in this category, a random choice was made. In fact, however, 8 courses from the remaining 27 were sampled. In retrospect this has turned out to have some advantages, since the number of courses without a year 5 French prerequisite is so high that the secondary/post-secondary interface is indeed broader than had been initially perceived. This is borne out by data on the actual levels of admission to courses without a year 5 prerequisite; these appeared to differ little from those in the other groups (see Table 4.11).

In summary, 20 courses were selected for analysis. Twelve of these were drawn from the 25 having a year 5 prerequisite; 8 were distributed among the other groups.

B. Factors Influencing the Teaching of Courses

1. *BACKGROUND OF THE INSTRUCTORS (Figure 6)*

The 20 instructors responding varied widely in their years of university teaching experience and the number of years they had taught this course. As a group, moreover, they had had a great deal of experience teaching at other levels. Seven had taught at secondary level, 5 at more than one other level, and two at elementary level. Only one in four had no such experience outside the universities. Compared to other university courses studied, a very high percentage of French instructors (50 percent) did not hold the Ph.D. degree. Fifty percent had Master's degrees; two instructors had Honours Bachelor's degrees. As might be expected from the wide range in years of experience, university rank distribution was also wide.

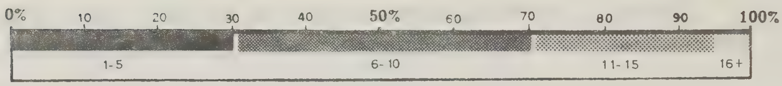
2. *PREREQUISITES OF THE COURSE*

This matter has been discussed in relation to the selection of the sample.

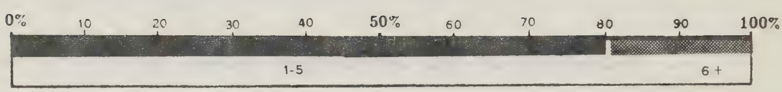
Figure 6
BACKGROUND OF INSTRUCTORS

UNIVERSITY FRENCH YEAR 1
PERCENTAGE OF INSTRUCTORS IN EACH CATEGORY

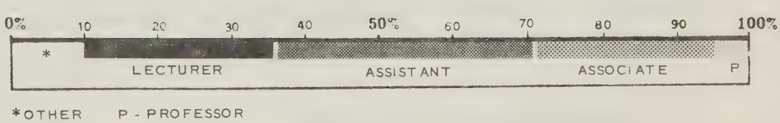
Years Teaching at University



Years Teaching this or Equivalent Course



University Rank



Information on two courses was not provided. Of the remaining 18, 8 earlier referred to had no year 5 prerequisite. However, the level of competence at entry of students in these courses was not rated significantly lower than in many courses having year 5 as a prerequisite. It seems, therefore, that the students going forward into these courses were mostly products of year 5 French courses. Nevertheless, the lack of prerequisites invites great variation among the entering students. Some of the high variability which distresses university teachers is clearly self-inflicted.

3. *CHARACTERISTICS OF INCOMING STUDENTS*

As with the secondary school teachers, instructors in the universities were impressed - and to some extent depressed - by the variability of incoming students. Nineteen of the 20 respondents rated their classes as showing a great deal of variation, one said a moderate amount.

The overall preparation of students was rated rather more highly; only 2 instructors considered it poor; 12 thought it fair, 1 good. None considered it excellent. Questioned on the areas of best and worst preparation, instructors thought students well prepared in attitudes and 11 specified they were most poorly prepared in knowledge or in a combination of knowledge and skills.

The dissatisfaction may, as for the secondary schools, be localized more precisely by deriving "satisfied" and "unsatisfied" categories of teachers from the actual and preferred level of entry for each of the 17 topics or content areas listed in the questionnaire (see Table 4.6).

The substantial percentages of instructors who failed to comment on skills in translation must be interpreted as an indication that these skills are of less interest to these instructors than they are even to teachers in the secondary schools. In general, the pattern of responses for the year 5 and university instructors is very similar in most categories in Table 4.6.

TABLE 4.6

UNIVERSITY FRENCH YEAR 1
PERCENTAGE OF INSTRUCTORS PREFERRING A HIGHER LEVEL
OF STUDENT COMPETENCE AT ENTRY TO YEAR 1

Topic area	% of instructors	No reply
1. Grammar - basic morphology and syntax	75%	10%
2. Grammar - conjugation of all regular and auxiliary verbs	70	10
3. Grammar - common tenses and moods	70	10
4. Ability to apply grammar in writing and in speaking	85	5
5. Ability to express ideas clearly and correctly in written French	85	5
6. Skill in translation - English to French	45	40
7. Skill in translation - French to English	15	55
8. Vocabulary - general	90	5
9. Vocabulary - idiomatic expressions	95	5
10. Vocabulary - Canadianisms	65	30
11. Reading comprehension	60	5
12. Aural comprehension	75	5
13. Fluency in spoken French	85	5
14. Literary history	40	35
15. Concepts of literary criticism	45	30
16. Vocabulary of literary criticism	45	30
17. Understanding of cultural differences and similarities	65	20

4. OTHER FACTORS INFLUENCING TEACHING

The responses to the list of factors which influence course design and teaching are tabulated in Table 4.7 in the same form used previously for the secondary school.

As with the data from secondary school teachers, Table 4.7 raises some interesting questions, especially to those concerned with the debates over total or partial autonomy for teachers. Every factor except principal text is ignored by at least one teacher in ten.

TABLE 4.7

UNIVERSITY FRENCH YEAR 1
FACTORS INFLUENCING TEACHING OF THE COURSE

Factor	% of Instructors Responding			
	No weight	Small to moderate	Heavy weight	N/A
Interests of students	10%	15%	70%	5%
Students' knowledge	10	35	50	5
Relationship to concurrent courses	35	35	15	15
Information on students' future plans	25	50	10	15
Assigned course outline	10	45	30	15
Teachers' interests or training	20	30	40	10
Principal text	5	50	40	5
Staffing	20	20	20	40

TABLE 4.8

UNIVERSITY FRENCH YEAR 1
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	% of Instructors Responding				
	None	Little	Moderate	Heavy	N/A
1. Skill in reading	0%	15%	30%	55%	0%
2. Skill in writing	0	0	20	80	0
3. Aural comprehension	0	0	15	85	0
4. Skill in speaking	0	5	30	65	0
5. Knowledge of literary history	37	21	21	5	16
6. Sensitivity to beauty and elegance in language	20	40	20	20	0
7. Appreciation of and sensitivity to cultural variety	5	25	45	25	0
8. Application of techniques of literary criticism	45	5	10	20	20
9. Appreciation of language as a medium of human thought	10	5	60	25	0
10. Interest in language studies	15	25	40	20	0
11. Respect for precision of expression (oral and/or written)	0	5	20	75	0
12. Self-confidence in French	0	5	15	80	0
13. Self-reliance	5	10	30	40	15
14. Understanding of self	18	30	23	23	6

C. Characteristics of the Course

1. *AIMS OF THE COURSE*

University instructors were offered the same list of aims described for the secondary school courses. The results of the survey are summarized in Table 4.8, where the aims are ranked according to the emphasis teachers placed upon them.

The table looks very much like the one prepared from the secondary school responses, with heavy and uniform emphasis on the first four aims and then much greater diversity.

2. *OBJECTIVES, LEVELS OF ACHIEVEMENT AND TIME ALLOCATION*

Because the aims discussed in the previous section are often achieved through several kinds of topics and content objectives, the content of courses in the universities was, as for the secondary schools, analyzed in greater detail. The results for the universities are shown in a tabular analysis of the first year university courses in parallel with that for the secondary schools in the interface section; and comment on these data will be deferred until the comparisons are to be made.

3. *TEACHING METHODS*

Problems of transition from one institution to another may be exacerbated if there is a marked change in the style of teaching. Table 4.9 permits a judgement on this through a comparison with Table 4.4 in the secondary school section.

It is perhaps sufficient to say here that translation receives very little attention as a teaching method in the universities, that only about half of the university courses use language labs, that the lecture varies widely in emphasis - 30 percent do not use it at all, and 45 percent use it heavily. It is clear that the teaching methods within each course are varied. Except for "lecture" and "Socratic", no method is generally used more than 20 percent of the time.

TABLE 4.9

UNIVERSITY FRENCH YEAR 1
TEACHING METHODS

Method	% of Instructors Using for % Range of Time			
	Not at all	1-10%	11-20%	20+%
Dictation	55%	45%	0%	0%
Translation by student	75	10	15	0
Language laboratory	45	25	20	10
Lecture	30	20	5	45[a]
Socratic	10	15	15	60[b]
Small group activities	60	25	10	5
Seminar, tutorial	60	20	10	10
Classroom study	80	20	0	0
Individualized instruction	95	5	0	0
Student presentation	55	40	0	5
Testing	25	70	5	0
Audiovisual	45	45	0	10
Field trips, visitors	90	10	0	0
Dramatic presentations	65	30	5	0
Other	90	10	0	0

[a]This figure breaks down as follows: 21-30% of time, 15%
31-40% of time, 15%
51-75% of time, 15%

[b]This figure breaks down as follows: 21-30% of time, 20%
31-40% of time, 15%
41-50% of time, 10%
51-100% of time, 15%

The variation in the amount of out-of-class study was considerable, as it was with the secondary schools. At the extreme ends of the range, 5 percent expected about 30 minutes for each hour of class time, and 10 percent expected 3 hours or more. The remainder were rather evenly divided into those expecting one hour, one and a half, and two hours for each hour of class time.

The demands on out-of-class time are apparently heavier in the universities, but the degree of variation in what is demanded is comparable.

Styles of teaching are also reflected in the use of various types of classroom resources. For the university courses studied, the importance of main texts, or small packages of texts, is clear (see Table 4.10), as is the fact that, with the exception of simplified editions of great works and individualized learning packages, all the methods are used by 60 percent or more of the teachers. These observations are not very different from those made earlier for the secondary schools.

The texts used were named by 17 of the 20 respondents, who mentioned a total of 41 titles; no one text was mentioned more than twice, and only 5 were in this select category.

The conclusion is that textual materials are highly varied, and presumably, as with the secondary schools, fairly variable in their level of difficulty.

Among other issues raised in the review of teaching was that of percentage of instruction given in French. No course used less than 70 percent, and 70 percent of instructors claimed to be in the 96-100 percent range.

In the matter of time spent on review, 45 percent said that they spent no time in this way, and 35 percent spent a small amount - less than was the case with the secondary schools.

As some of the earlier tables implied, individualized instruction was not heavily used: 60 percent did not use it at all, 30 percent used a slight to moderate amount, and only 10 percent had individualized their course presentation "to a great extent".

TABLE 4.10

UNIVERSITY FRENCH YEAR 1
TEACHING RESOURCES

Resource	Use by % of Instructors			
	Not at all	slight to moderate	Great Extent	No Reply
Main text	11%	16%	68%	5%
Main text plus supplementary text(s)	16	31	42	11
Two or more main texts or materials from other texts	28	17	44	11
Simplified editions of great works	71	12	6	11
Works of criticism	38	44	6	11
Reference books, dictionaries, encyclopedias, etc.	6	66	28	0
Individualized learning packages	78	6	6	11
Other classroom resources (magazines, newspapers, etc.)	45	44	11	0
Audiovisual media (T.V., tapes, filmstrips, etc.)	38	50	11	0
Language laboratory materials	32	43	20	5
Mimeographed materials (lecture notes, etc.)	37	47	11	5

4. EVALUATION PROCEDURES

Evaluation procedures have been discussed in a general way in the previous section on the year 5 courses. That need not be repeated here. Nor is it profitable to discuss the extent to which various components are used to arrive at a final mark since the interface section to follow includes a comparative tabulation of the data from the two samples.

D. Discussion

In terms of calendar descriptions, prerequisites, aims, evaluation procedures and indeed in all aspects studied, university courses are a heterogeneous group, a good deal more so than the year 5 courses.

The causes for the general variation, without attempting to weight them, appear to lie in variability in: prerequisites, objectives, staff interests, student objectives, student achievement and staff views on what is important.

The Secondary - Post-Secondary Interface

The functioning of the interface between sequential courses which imply an increasing level of achievement depends upon several factors. Some of these are:

1. The extent to which there is agreed basic material on which later work must build, i.e., the strictness of the hierarchical development in the subject;
2. The degree of individualization which it is practical to attain;
3. The uniformity of standards in the certification process;
4. The reliability of measures of achievement and the size of "step up" required from course to course in each sequence;
5. An adequate system of coordination for resolving the questions inherent in 1, 3, and 4 above.

The discussion of the interface between year 5 secondary school and first year university courses in French will follow these points except that the discussion of coordination is contained in a general section of this report dealing with that issue and with the specific mechanisms found in the course of this study in each subject area.

1. THE "AGREED" BASICS IN FRENCH

Several lines of evidence derived from this study indicate a widespread belief among French teachers at both secondary schools and universities that there is a definable body of basic structural knowledge and vocabulary appropriate to French at these levels. This is, of course, not surprising, in view of the fact that the years in question represent the fifth and sixth years, at least, of a sequence of courses in which each, with a few exceptions, requires the previous level as a beginning.

The existence of substantial agreement among French teachers

about aims was supported by the initial committee work for drafting the course description questionnaire and by the extremely high proportion of respondents who emphasized the four basic skills of reading, writing, listening and speaking. If one makes the very reasonable assumption that the few teachers not stressing the "basics" are doing so on the assumption that they have already been covered adequately, then it appears that there is no doctrinal split among French teachers about building a firm grammatical-vocabulary base before attempting literary or cultural studies. If there are problems they relate to 3, 4, and 5 below.

2. *THE DEGREE OF INDIVIDUALIZATION*

A teaching program which provides entirely individualized packets of materials, while primarily altering the rate at which a subject is covered, could also vary the amount of attention given to the "basics". However, there was, in this study, no indication that Ontario teachers (at the levels surveyed) treat French as a subject suitable for individualization. There were only 3 teachers among the 71 in both samples who claimed a high degree of individualization in their courses; 53 reported none, and the remaining 15 had some.

3. *THE UNIFORMITY OF STANDARDS*

Agreement that there is a core of basics does not imply that there will be agreement on the levels of achievement in the basics appropriate to each sequential course. It is now necessary to examine the data from the course questionnaires to attempt to determine the extent of agreement on this issue.

The first evidence comes from the "levels of satisfaction" tables for year 5 and university teachers. Both groups have a heavy preponderance in the "dissatisfied" categories. There is very little difference in general between the views of the two groups: items 4, 5, and 6 dealing with precise grammatical expression in French (whether written or spoken) come in for the highest "dissatisfied" ratings. The major area of discrepancy between the two groups is in the matter of

TABLE 4.11

SECONDARY SCHOOL YEAR 5-UNIVERSITY YEAR 1 FRENCH INTERFACE
OBJECTIVES (BY CONTENT OR TOPIC), LEVELS OF ENTRY AND EXIT, AND TIME ALLOCATIONS

Topic	% Teaching Topic		Mean Level of Entry[a]		Mean Level of Exit		% Time Allocated	
	Year 5	Univ.	Year 5	Univ.	Year 5	Univ.	Year 5	Univ.
1. Grammar - basic morphology and syntax	75	70	1.9	1.6	2.4	2.4		
2. Grammar - conjugation of all regular and auxiliary verbs	73	75	2.0	1.6	2.5	2.5	22	18
3. Grammar - common tenses and moods	75	70	2.0	1.7	2.6	2.6		
4. Ability to apply grammar in writing and speaking	86	80	1.6	1.4	2.4	2.4		
5. Ability to express ideas clearly and correctly in written French	82	80	1.5	1.1	2.2	2.2	13	14
6. Skill in translation - English to French	78	45	1.4	1.1	1.8	1.8	7	3
7. Skill in translation - French to English	51	30	1.6	1.4	2.2	2.2	3	1
8. Vocabulary - general	90	80	1.8	1.4	2.4	2.4		
9. Vocabulary - idiomatic expressions	82	90	1.5	1.9	2.1	2.1	10	8
10. Vocabulary - Canadianisms	61	50	.9	.7	1.5	1.5		
11. Reading comprehension	75	75	2.0	1.7	3.5	3.5	13	10
12. Aural comprehension	76	75	2.0	1.7	2.6	2.6	10	13
13. Fluency in spoken French	76	80	1.7	1.2	2.2	2.2	13	14
14. Literary history	53	45	.5	.3	1.2	1.2	1	3
15. Concepts of literary criticism	47	45	.4	.4	1.3	1.3	.5	6
16. Vocabulary of literary criticism	43	45	.4	.4	1.3	1.3	.5	4
17. Understanding of cultural differences and similarities	80	70	1.4	1.1	2.1	2.1	6	3

[a]The computation of mean level of competence at entry and exit was derived from the following scale: 0- No competence; 1- Minimal competence; 2- Moderate competence; 3- Competence in varied situations, some originality; 4- Mastery, competence in high level, creative situations.

vocabulary. Many year 5 teachers were satisfied and few were dissatisfied. On the other hand, almost no university instructors were satisfied and about a quarter appeared to be very dissatisfied.

These views on the vocabulary issue are somewhat hard to reconcile with the data provided by the teachers. Over half the secondary school teachers claimed their students had, on completion of their courses, vocabularies of better than 2,000 words, whereas only one in 20 of the university teachers considered students arrived with 2,000 words at their disposal. Indeed, only 8 of 18 university instructors responding to this question claimed to get their students to this level by the completion of their course. Either these data must be regarded with suspicion or the university courses in French must be accused of assisting in or at least tolerating a backward slide in French vocabulary throughout the first year. In fact the university data claim a sharp rise in the size of student vocabulary over the admission level. There is, therefore, in these data a clear difference in perception of vocabulary size but very little specific information on what the sizes really are.

The levels of achievement in year 5 and in university can also be compared with respect to other objectives of the course, by tabulating the average levels of achievement attained in year 5 with those considered to have been attained at entry to the universities. These data are in Table 4.11, coupled with information on the percentage of each group teaching that topic and the percentage of time allocated to it.

In terms of the interface problem - especially as it deals with excessive gaps and redundancies in year 5 and first year university - the two columns of Table 4.11 which are of greatest interest are the exit level of year 5 and the entry level to university. Assuming more than a modicum of agreement on basic skills, one might expect agreement on levels in such areas. One might then be able to use the areas which differed to diagnose topics on which closer coordination of planning might be profitable.

There is a major discrepancy throughout these columns: the average of the year 5 teacher's perception of the level which their

students have attained is much higher than is that of the university instructors who teach the students. This difference in perceptions cannot be rationalized on the basis that the poorer students go on to university. Indeed the reverse is almost certainly true, making these perceptions of average achievement even more puzzling.

In anticipation that the scale of competency might be seen differently by the two sample groups a series of questions and student answers were developed and tested on each group (see discussion of Rating Validation Instruments in Vol 2). The respondents were asked to rate the student questions and answers on the same scale of competence used in the major questionnaire. The results were that some items were, on average, marked more stringently by the university and some by the year 5 teachers. Overall, the balance of marking was essentially even.

The rather striking difference in perceptions must, therefore, be explained in terms of the difference in perspective: teachers of year 5 see the student in relation to classes of lower achievement, university instructors in relation to classes of higher achievement (second, third and fourth year courses at university). Such different situations might well influence perceptions of how to use a scale of competence while still permitting marking on a more realistic than idealistic basis.

Whatever the explanation, differences in perception within and across the two groups make it necessary to interpret analyses based on perceived levels of average student ability very cautiously. It is perhaps worth noting that the greatest discrepancies are in the ability to express ideas clearly, in vocabulary, and in understanding cultural differences and similarities. Some aspects of grammar also show a high discrepancy. It is, however, noteworthy that these areas are in many cases the areas of concern in English, and we may not be dealing here with problems specific to French.

On the whole there is agreement between the relative achievement in different topics as seen by the two sample groups. Where the year 5 teachers are claiming to have improved the competence of their

students in, for example, general vocabulary, regular verbs, and basic morphology, the university members are prepared to accept these as being among the better learned topics.

It must be recognized that comparisons in Table 4.11 are based on averages among markedly different courses. The lower values in areas such as literary history and criticism reflect only partial participation in these topics. Comparisons are, therefore, principally of use in the "basics" as defined by the teachers themselves in the earlier aims sections.

If we accept that the evidence from the marking of test questions is rather more convincing than the competency scale reported here, then there seems to be a fair match, on average, between the year 5 courses and the university courses. There are also close parallels between the aims, the teaching styles, and the relative times spent on different topics. The interface problems, if they exist, are not, therefore, due to any major differences in standards seen in terms of "averages". They appear rather to be in the areas of variability. There was almost uniform concern over this factor, and the various detailed analyses have indicated variations in the idea of what constitutes an acceptable standard in basic skills at this level. This results in some students proceeding to specialized studies before they are adequately prepared. In general, then, the standards are a problem on both sides of the interface because they are not sufficiently uniform. This judgement was made quite explicit by a number of heads of French departments in schools, who lamented the loss of a standardizing, province-wide examination.

While on the subject of the uniformity of standards, and before looking at the issue of the size of the "step up" it is worthwhile to look briefly at the data on evaluation procedures, at least to the extent that these are reflected in the calculation of the final mark for a student (see Table 4.12).

The emphasis on the final examination is considerably greater in the universities, but not completely consistently so. The secondary schools, on the other hand, fall into a clearly bimodal grouping; a large number do not use final exams and the rest give them fairly heavy weighting.

TABLE 4.12

SECONDARY SCHOOL YEAR 5-UNIVERSITY YEAR 1 FRENCH INTERFACE
ALLOCATION OF FINAL MARK (BY % RANGES)

Item	Secondary School				University			
	0%	1-10%	11-20%	21+%	0%	1-10%	11-20%	21+%
Final examination	0% [a]	7%	0%	93%	5%	10%	25%	60%
Mid-term examination	25	4	24	48	15	40	25	20
Other written tests	2	14	39	45	25	35	15	25
Other oral tests	16	43	37	4	40	30	25	5
Individual papers (essays, reports, book reports, etc.)	31	31	30	8	25	20	25	30
Group or team papers	90	10	0	0	100	0	0	0
Individual projects (exclusive of essays, reports)	65	23	12	0	80	20	0	0
Group or team projects	84	14	2	0	90	10	0	0
Notebooks	96	4	0	0	100	0	0	0
Effort	61	37	2	0	55	35	5	5
Class participation	41	49	10	0	35	60	5	0
Attendance	84	16	0	0	70	30	0	0
Individual oral presentation (prepared or spontaneous speeches)	31	53	16	0	75	25	0	0
Group dramatic presentations	78	18	2	2	95	5	0	0
Other	96	0	2	2	80	15	0	5

[a] Percentage of teachers in each percentage range

Except for the differences mentioned, the practices are similar - at least as revealed by this kind of analysis. Both groups tend to base final marks on a large number of different components. Here, as in other aspects reviewed, there is no major discrepancy or jump evident in the approach, viewed generally, but there is still room for individual courses to vary sharply from the general picture.

4. THE "STEP UP" BETWEEN SEQUENTIAL COURSES

It is not wise to define too closely the intended increment in achievement from one level to the next. To do so would be to ignore the very real and unavoidable variation in teachers and students, to impose a lockstep program which would be unacceptable in today's climate. On the other hand, there has to be some visible and agreed progress or there is no system.

The problem of excess variability dealt with in the previous section greatly exacerbates the problem of having even a reasonably agreed increment for each successive course. A measure of standardization is needed to give meaning to the increments.

In the matter of reasonable increments of achievement it is, however, necessary to refer once again to the anomalous situation in which fewer than half of the courses listed in the university calendars require year 5 French as a prerequisite, yet the levels of competence of students entering courses without a prerequisite are reported as being essentially the same as those who entered the courses with a year 5 prerequisite. This invites a question: how many students who have taken year 5 are taking these university courses simply to get an easier credit? To the extent that they are doing so, there may be gross redundancy in the teaching of French in the universities.

5 History and Histoire

SECONDARY SCHOOL HISTORY/HISTOIRE
YEAR 5

UNIVERSITY HISTORY/HISTOIRE YEAR 1

LIST OF TABLES

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5

Histoire and History as taught in the secondary schools appear to be essentially the same course drawn from the same Ministry of Education guidelines, with one presented in French, the other in English; this report will deal with both courses. However, it should be borne in mind that the differing emphases and attitudes of English- and French-speaking teachers will result in differences in presentation and course description.

A. The Sample

1. THE POPULATION OF COURSES

The sample included 14 French-language and 53 English-language secondary schools. All 14 French-language secondary schools offer a course in histoire in year 5. Of the 53 English-language schools, one did not offer year 5 courses, and another was not offering any year 5 history in 1975/6, so questionnaires were sent to respondents in 51 schools. One of these potential respondents was in hospital. All other questionnaires were returned; the data from the 14 French-language and 50 English-language secondary schools form the basis of the report which follows.

Table 5.1 lists the year 5 History/Histoire courses offered in the sample of schools we selected.

TABLE 5.1

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
COURSES IN THE SAMPLE OF SCHOOLS

Nature of course	History				Histoire			
	Courses offered		Courses selected		Courses offered		Courses selected	
	N	%	N	%	N		N	%
Canadian History	23	36	21	42	14	93	14	100
Canadian and American History	29	45	29	58	-	-	-	-
American History[a]	11	17	0	0	1	7	0	0
Asian studies	1	2	0	0	-	-	-	-
Total	64	100%	50	100%	15	100%	14	100%

[a]American history courses are offered only in those schools already offering a course in Canadian history.

The courses were selected so that they would be representative of courses offered in histoire/history year 5 and so that the group of courses formed would be large enough to permit useful analyses.

All 14 histoire courses chosen, one from each French-language secondary school, dealt with Canadian history, though two of the courses also contained sections pertaining to the United States. One course dealt with the United States historically, the other concentrated on American problems in the nineteenth and twentieth centuries.

In 34 of the 50 schools offering history, only one course in year 5 is offered. However, one should remember that there are courses currently offered in these schools which are closely related to histoire/history; for example, economics. Of the 16 English-language secondary schools which offer a second course, 12 schools have a population of 1,100 students or more. Three other schools, because of the nature of their organization (semestered or trimestered) are offering essentially one course split into two or three semesters.

It was decided to select only Canadian history courses rather than draw from American history courses both because the Canadian history courses provided a group large enough to permit analyses, and

because of current concerns about the knowledge and understanding of Canadian history among Canadian youth. Moreover, the mixed Canadian and American history course offering does contain a proportion of American history.

2. *NATURE OF COURSES SELECTED*

Although school calendar descriptions and titles of courses provide the classification of courses in Table 1, 39 history respondents indicated that the major emphasis in their course is Canadian history (taught more than 50 percent of the time). Only 7 courses in history, and 2 in histoire, spend over 40 percent of the time in American history. Other countries (e.g., Europe, Britain) seem to be touched only as they relate to Canadian history. Essentially, then, courses presented in year 5 history/histoire seem to be quite similar in emphases. The time span of the course appears to be from before 1763 to "the future", with instructors spending a little more time on periods significant to Canadian development (e.g., 1764-1867).

The primary emphasis in courses appears to be political: 8 (57 percent) of the histoire and 31 (62 percent) of the history respondents spent over one-third of their time on political aspects, while 48 (96 percent) of history respondents spend up to 30 percent of their time on economic aspects. Social and cultural aspects (and economic aspects in histoire) absorbed the time remaining. Five histoire respondents indicated that their courses were organized primarily by period or era; 5 utilized a thematic approach. Organization of a course via a series of problems was perceived as a secondary organizing device by 5 of the histoire respondents.

In history, a thematic approach to organization of the course was the most popular and was utilized by 57 percent of the respondents. Another 20 percent organized their courses around a series of problems. These are basically the approaches recommended by the Ministry of Education guideline for year 5 history (History: Senior Division 1970).

B. Factors Influencing the Teaching of Courses

1. BACKGROUND OF THE INSTRUCTOR

One is impressed by the professional experience and expertise possessed by the majority of histoire/history teachers. Ten of the 14 respondents (71 percent) teaching histoire possessed an Honours Bachelor's degree, 11 (79 percent) of them were in AEFO category 4. Since French-language secondary schools were not established until 1968, it is not surprising to find that the teaching experience of the majority of histoire teachers falls into the 6-10 year category. Ninety percent of history teachers had taught at secondary schools for 5 years or more; over half (68 percent) had taught for more than 10 years. This, of course, means that 68 percent of the respondents who were teaching during the era of external Departmental examinations, and under the Reorganized Program, now teach under the credit system; it is useful to keep in mind that their responses are given from this perspective. Eighty-two percent of the history teachers were teaching in their area of specialization; another 12 percent indicated that the course was closely related to their area of specialization; 94 percent were in the OSSTF certification category 4 with another 4 percent in category 3. Over half of the respondents (64 percent in histoire, 56 percent in history) were department heads. However, one might expect the senior members of histoire/history departments to be teaching courses in the senior year.

2. PREREQUISITES OF THE COURSE

Ten (71 percent) of the 14 histoire courses did not have specifically stated prerequisites. The prerequisites suggested for the remaining 4 courses varied. Two suggested successful completion of an histoire course, although one specified that it be a senior level histoire. A third course recommended strongly that one intermediate as well as one senior level histoire precede the year 5 histoire course; however, a student might enter this course if he wished to take it and a

Figure 7

BACKGROUND OF TEACHERS

SECONDARY SCHOOL HISTORY YEAR 5
PERCENTAGE OF TEACHERS IN EACH CATEGORY

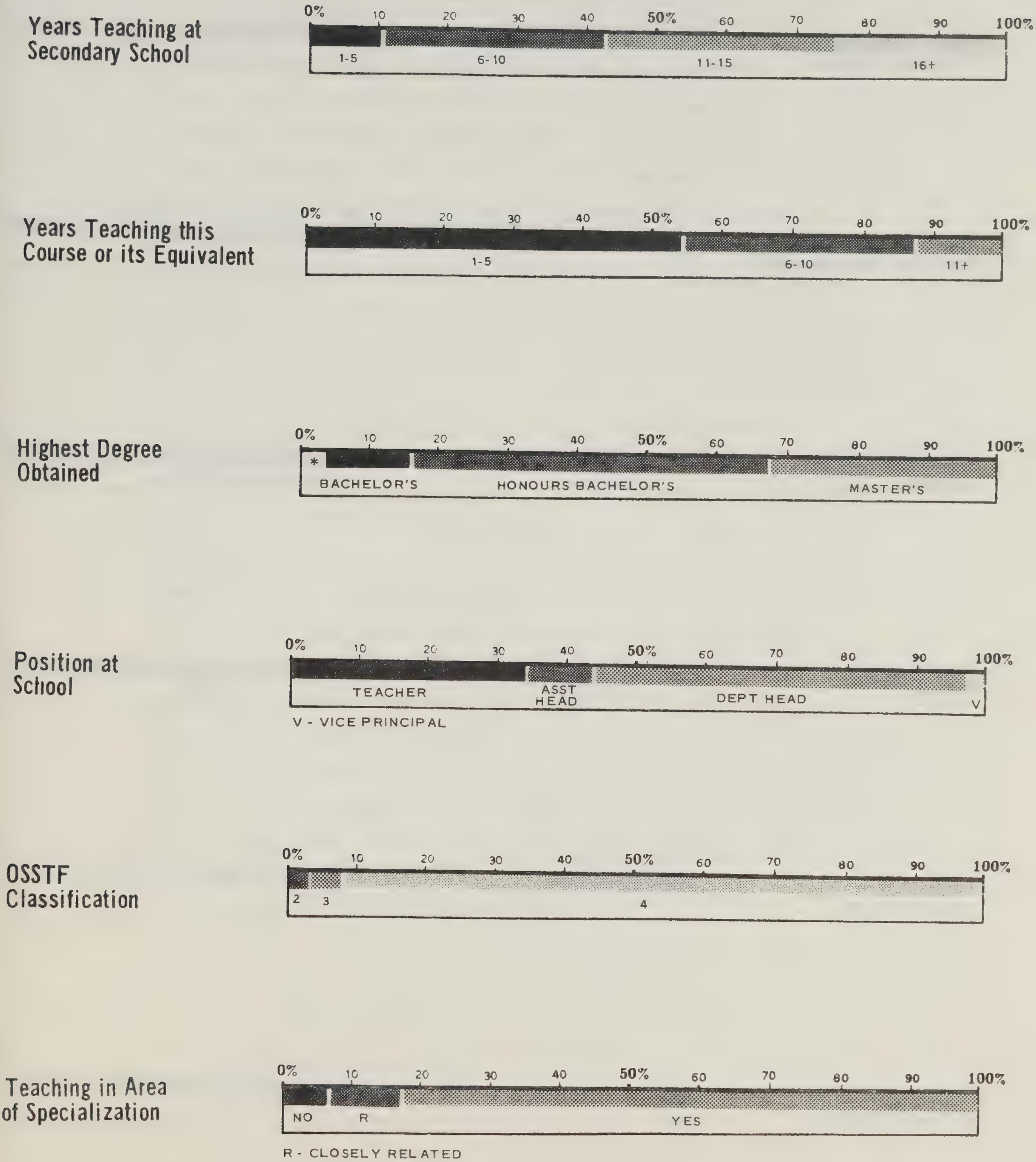
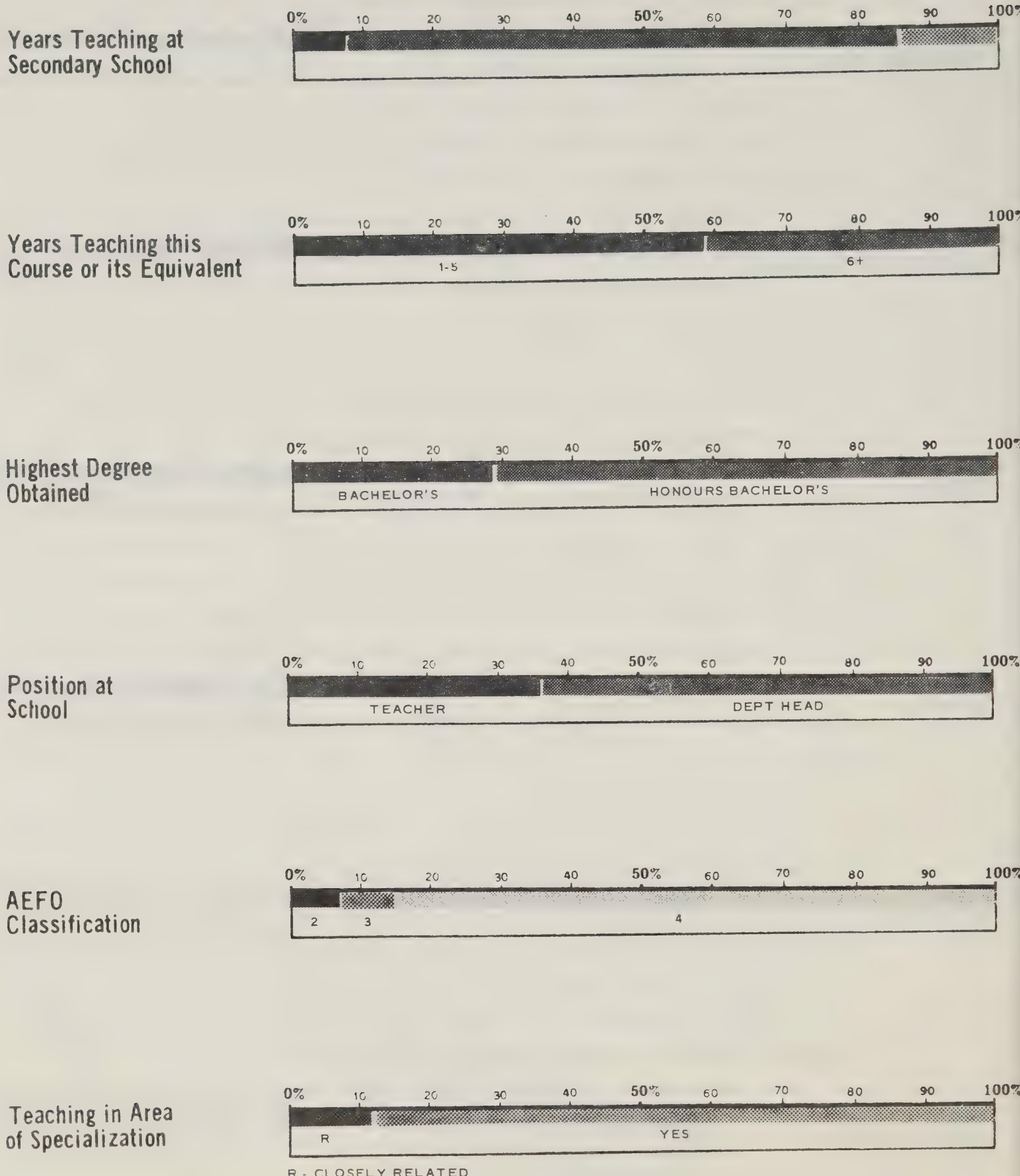


Figure 8

BACKGROUND OF TEACHERS

SECONDARY SCHOOL HISTOIRE YEAR 5
PERCENTAGE OF TEACHERS IN EACH CATEGORY



histoire instructor thought he was capable of coping with it. The remaining histoire course suggested that students entering year 5 histoire should have successfully completed (60 percent or over) senior level advanced courses in various subjects.

Of the courses selected in history, 66 percent required or strongly recommended a history prerequisite, although the nature of the prerequisite varied quite a bit. The most popular recommendation was one advanced level credit in either year 2, 3, or 4 history (73 percent required this). It is difficult to determine how frequently permission from the teacher or department head is used as an entry procedure. Entry into a course by permission of the teacher should ensure that at least the student is motivated, and is interested in history. However, since proportional enrolments in history courses at secondary schools have recently been declining--from 9.0 percent of total enrolment in courses in 1970/1 to 7.7 percent in 1974/5--teachers may tend to be lenient in permitting entry into their courses.

Such variation in prerequisites from one school to another will have important implications for the interface. Concurrently, one might expect that teachers from school to school will have different expectations of the competence of incoming students. In schools where two or three advanced level credits are required, the instructor may presumably anticipate quite a high level of knowledge and skill in history. If no prerequisites are required, a number of students may not have taken history since years 1 or 2. Although two credits in Canadian studies are now required for the SSGD, Canadian studies include any course which contains Canadian content, from a Canadian music course to a course in the Canadian novel. Thus, these two credits for Canadian studies need not assume a knowledge of or exposure to Canadian history.

3. CHARACTERISTICS OF INCOMING STUDENTS

(a) Quality of Preparation

There was an even split in response to the item asking histoire instructors to rate the quality of preparation of incoming students. Although half the instructors rated the quality as acceptable, none gave it a rating "très bien"; half rated it as "pas suffisamment". This is perhaps inevitable, bearing in mind that teachers were asked to rate a group, not individuals.

It was the lack of general knowledge which disturbed 11 of the 14 histoire teachers. Half of the respondents commented upon the need for greater competence in historical skills. However, the absence of prerequisites for many histoire courses may help to explain this lack. Only 4 respondents (28 percent) commented upon students' lack of skill in oral and written communication. Those teachers who commented positively about students' preparation for year 5 histoire cited their interest in histoire (5 respondents); those students entering year 5 histoire with a background in histoire were perceived as having a satisfactory level of general knowledge by 2 respondents.

In history, 61 percent of the respondents rated the quality of preparation of incoming students as "fair" or "poor", while 39 percent rated it as "good". This difference of opinion is revealed further by teachers' comments concerning areas in which incoming students should be better prepared. For instance, 15 respondents (30 percent) recommended that students be better prepared in the skills necessary for historical comprehension and analysis; 8 (16 percent) indicated that students seemed to be adequately prepared in this respect. A different split can be seen in teachers' comments about students' attitudes toward work and the course: 13 (26 percent) of the respondents spoke favorably about the attitudes of their students toward learning, work, and interest in the course, but 8 (16 percent) indicated that students' attitudes, particularly toward the amount of work required for the course, needed improvement. Most comments (54 percent), however, stressed that incoming students should have a better grasp of communication skills, particularly writing. Some

were concerned about students' ability to read and comprehend material. A comment made by one respondent seems to reflect the view of many of them: "The good students do well and perform admirably, the poor students are destroyed." Since the inception of the credit system, year 5 teachers are undoubtedly seeing more students of moderate or low competence; before the increased flexibility inherent in the credit system they would not have been permitted to take year 5 history.

(b) Variability in Competence, Interests, Programs, Future Plans

Histoire: Twelve (86 percent) respondents indicated that they thought there was extensive variation in competence of incoming students. Again, most comments (10) concerned the variability of the background of students, which resulted in variability in general historical knowledge and skills. One teacher stated "Il y a des élèves dans ce cours qui n'ont pas pris d'histoire auparavant alors que d'autres peuvent avoir quatre cours déjà."

Student interests bear only lightly upon the teaching of 8 histoire courses; 4 teachers perceived this factor as influencing them moderately. Some consideration was given to future plans, careers of students by 7 of the instructors. However, 4 respondents did not consider this aspect at all in teaching the course.

History: The comments about preparation of students are reinforced by the teachers' views about variability among incoming students: 96 percent of teachers perceived "moderate" or "a great deal" of variation in student competence. Year 5 students they are instructing have a variable historical background and grasp of skills. One respondent stated that some students in his year 5 course had not taken history since year 1 or 2 while others in the same class had come from the year 4 advanced level history course. It was also suggested that the diversity of student competence now evident in history classes has "changed the overall nature of the class". This diversity thus appears to be a major factor influencing the way in which the course is taught. Teachers ranked their own

TABLE 5.2

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
FACTORS INFLUENCING THE TEACHING OF THE COURSE

Factor	History		Histoire	
	WM[a]	R[b]	WM	R
Interests of students	2.3	1	1.2	6
Knowledge of students	1.4	4	2.0	3
Relationship to other concurrent courses	1.1	7	.8	9
Information on students' future plans	1.3	5	1.3	4
Ontario Ministry of Education guidelines	1.9	3	2.3	2
Assigned course outline	1.0	8	1.3	4
Teacher's special interests or training	2.3	1	2.9	1
Principal text(s)	1.3	5	1.2	6
Staffing	.6	9	.9	8

[a] WM= weighted mean. Each category was assigned a weighting: 0-not at all, 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b] R= rank. Factors were ranked on the basis of weighted means.

"special interests or training" as an important influence upon the way they taught the course (see Table 5.2)

"Interests of students" ranked as high on the "importance scale" of considerations (see Table 5.2). This factor has perhaps gained importance with the introduction of the credit system because courses must now be made attractive to students or they may choose not to select history. Information concerning future plans, careers of the students did not appear to be a strong influence upon the teaching of the course.

4. *OTHER FACTORS INFLUENCING TEACHING*

Ontario Ministry of Education guidelines figured prominently as an influence upon the teaching of both histoire and history; but it must be remembered that the guidelines primarily provide a general approach, suggest certain topics and themes, and are certainly far from prescriptive.

Although the principal text influenced the teaching of the course, half (7) of the histoire respondents rated it as a minimal influence. This is substantiated by teachers' responses about the extent to which they use certain resource materials. Histoire teachers appear to have depended upon their own mimeographed materials to a greater extent than texts. Principal texts ranked fourth as a consideration in history, primarily because history courses appear to utilize a number of resources in addition to one or more texts. Only 4 (8 percent) of the respondents indicated that a principal text was a major influence upon their teaching of the course.

Since many of the respondents were either department heads or assistant department heads, it is not surprising to find that half of the respondents in histoire and 32 (64 percent) in history found the item "course outline assigned to you" inappropriate. However, 1 respondent in histoire and 7 respondents in history indicated that they were influenced by an assigned course outline to a great extent.

"Staffing" likewise proved a matter of little concern to the majority of respondents. Five histoire teachers and three history

teachers were influenced to a moderate or great extent by staffing considerations: team teaching, coordination with others teaching the same course or closely related courses, increased enrolment, all were cited as reasons why "staffing" had influenced the teaching of the course.

C. Characteristics of the Course

1. *AIMS*

The respondents were asked to assign an "emphasis-rating" to each of 22 general aims related to the year 5 histoire/history course. Although histoire teachers commented extensively upon the lack of knowledge of incoming students, the emphasis given to the student's acquisition of a specific body of historical information ranks curiously low. Development of skills required for the subject area was given most emphasis by the most teachers. Although 12 of the 14 histoire teachers claimed that they gave a great deal of emphasis to the development of an understanding of the relationship between historical events and contemporary issues, 11 of the 14 courses selected stated that they did not give more than 20 percent of their course time to the period between 1946 and the present. Thirteen of the 14 respondents indicated that they gave a good deal of attention to the development of skills required for preparation and presentation of written work. However, oral skills did not receive this same emphasis in 11 of the 14 courses. It is interesting to note that some attitudinal aims are given a great deal of emphasis (see items 17.4, 17.1).

TABLE 5.3

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	History WM[a]	History R[b]	Histoire WM	Histoire R
1. Acquire a specific body of historical information.	2.2	12	2.1	18
2. Develop skills required for analysis and interpretation of historical information.	2.8	1	2.8	2
3. Develop the ability to examine a historical problem from a variety of perspectives.	2.7	2	2.8	2
4. Consider historical issues in terms of the context of the time.	2.4	9	2.4	13
5. Understand the relationship between historical events and contemporary issues.	2.5	8	2.9	1
6. Develop an awareness of the complexity of historical issues.	2.6	3	2.5	8
7. Develop an awareness of one's relationship to society.	1.9	18	2.4	13
8. Develop an awareness of the growing interdependence of nations and people in the modern world.	1.7	20	2.2	17
9. Appreciate one's cultural heritage.	2.0	15	2.5	8
10. Develop an awareness of the diversity of cultures.	1.9	18	2.1	18
11. Develop the skills required for preparation and presentation of written work.	2.7	2	2.6	5

[a]WM=weighted mean. Each category was assigned a weighting: 0-not at all, 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b]R=rank. Factors were ranked on the basis of weighted means.

TABLE 5.3 (Cont'd)

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	History WM	History R	Histoire WM	Histoire R
12. Develop the skills required for preparation and presentation of oral work.	2.0	15	2.1	18
13. Encourage high scholastic standards.	2.4	9	2.3	16
14. Develop an attitude which promotes critical assessment of new information.	2.6	3	2.6	5
15. Develop an awareness of the approaches employed by related disciplines (e.g., economics, political science, sociology).	1.7	20	2.1	18
16. Increase students' interest in history.	2.4	9	2.5	8
17. Develop:				
17.1 respect and tolerance for diverse opinions and ideas;	2.6	3	2.6	5
17.2 independence; sense of responsibility;	2.6	3	2.4	13
17.3 self confidence;	2.1	13	2.5	8
17.4 social conscience (concern for others).	2.1	13	2.7	4
17.5 social skills (ability to work and interact with others).	2.0	15	2.5	8

The aims which ranked the highest for history teachers dealt with the development of skills; those skills required for analysis and interpretation of history and those necessary for successful presentation of written work. Attitudinal development was stressed in most history courses sampled--development of the student as a responsible, tolerant, perceptive individual. It is interesting to note that aims related to the development of social skills or responsibilities did not appear to rank as highly as historical skill aims. Considering the nature of the subject one might expect some such emphasis, yet one should be aware of the fact that all aims which receive a mean of 2 or above would probably receive some attention in a history course.

2. *THE OBJECTIVES OF THE COURSE*

Since the items in this section were to be appropriate to university as well as secondary school courses, the objectives listed are skill rather than content objectives. Respondents were asked to think of the "average" level of competence of their students upon entry to the course and after taking the course. The objectives were organized into four main areas; (1) research; (2) writing; (3) oral; and (4) analytic and interpretive.

As can be seen in Table 5.4, all objectives but two were taught by 75 percent of the histoire respondents. Sixty-four percent of the teachers indicated that they were concerned with developing small-group discussion skills; 71 percent spent some time on developing effective note-taking techniques. However, in both these areas most instructors did expect students to enter the year 5 course with some competence. One teacher indicated that he expected mastery of effective note-taking techniques by year 5 histoire. When one calculates the mean of the respondents' ratings for each item, the average level of competence expected from incoming students does not exceed 1.66. Even when the variability or range of responses is taken into account in terms of the standard deviation the highest level of competence does not exceed 2.5. Most fall below 2, or midway between minimal and moderate competence.

TABLE 5.4

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

	History					Histoire				
	% Teaching Topic	Entry		Exit		% Teaching Topic	Entry		Exit	
		$\bar{X}$[a]	SD	$\bar{X}$	SD		$\bar{X}$	SD	$\bar{X}$	SD
A. Research										
1. Use libraries effectively (card catalogues, reference materials, encyclopedias, etc)	82	1.6	.6	2.6	.6	100	1.3	.6	2.6	.6
2. Locate historical references (archives, government records, etc.)	64	.7	.9	1.6	.9	78	.5	.5	1.6	.9
3. Make effective use of historical references.	84	1.4	.7	2.4	.6	85	1.1	1.0	2.4	.8
4. Distinguish between primary and secondary sources.	76	1.4	1.1	2.5	.9	85	.9	.9	1.9	.9
B. Writing										
1. Demonstrate facility in planning and organizing written materials.	88	1.5	.7	2.5	.5	92	1.1	.7	2.4	.7
2. Use clear, concise prose necessary for the written presentation of concepts (essays, reports).	84	1.3	.7	2.4	.7	85	.9	.5	2.0	.7

[a] Items were rated on a scale: 0-no competence; 1-minimal competence; 2-moderate competence; 3-competence in varied situations, some originality; 4-mastery, competence in high level, creative situations.

TABLE 5.4 (Cont'd)

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

	History					Histoire				
	% Teaching Topic	Entry		Exit		% Teaching Topic	Entry		Exit	
		$\bar{X}$	SD	$\bar{X}$	SD		$\bar{X}$	SD	$\bar{X}$	SD
3. Use effective note-taking techniques	74	1.6	.8	2.5	.7	71	1.5	.9	2.2	.8
4. Apply historical terminology appropriately (e.g., Renaissance)	78	1.4	.8	2.4	.8	92	.8	.6	2.1	.6
5. Use appropriate conventions related to acknowledging references (e.g., footnotes, bibliography)	86	1.4	.8	2.7	.7	92	1.2	.8	2.6	1.6
C. Oral										
1. Explain concepts clearly.	88	1.3	.7	2.3	.6	85	1.0	.7	2.1	.7
2. Present an extended argument effectively.	86	1.0	.8	2.2	.9	92	.9	.5	2.0	.6
3. Present a prepared report	70	1.4	.7	2.4	.8	78	1.1	.6	2.0	.9
4. Contribute effectively in a small group discussion.	76	1.5	.8	2.4	.6	64	1.4	.9	2.2	1.1
D. Analytic and Interpretive										
1. Comprehend a variety of historical sources:										
1.1 documents	72	1.2	.7	2.1	.8	92	1.3	.8	2.5	.9

TABLE 5.4 (Cont'd)

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

	History					Histoire				
	% Teaching Topic	Entry		Exit		% Teaching Topic	Entry		Exit	
		$\bar{X}$	SD	$\bar{X}$	SD		$\bar{X}$	SD	$\bar{X}$	SD
1.2 monographs	68	1.2	.9	2.1	.9	85	.9	.9	1.9	1.1
1.3 texts	68	1.8	.8	2.6	.8	85	1.4	.9	2.6	.8
2. Analyze material read in terms of:										
2.1 identification of main thesis or argument	82	1.5	.8	2.5	.7	92	1.1	.6	2.1	.7
2.2 identification of significant/pertinent information	80	1.6	.7	2.5	.7	85	1.1	.9	2.3	.9
3. Present an argument effectively in terms of organization, substance, (supportive factual material) logical conclusions.	88	1.3	.7	2.4	.7	92	.9	.5	2.1	.8
4. Distinguish between essential and non-essential information.	88	1.4	.8	2.5	.9	85	1.1	.6	2.1	.7
5. Distinguish between fact and interpretation.	78	1.5	.9	2.5	.8	85	1.2	.7	2.3	.8
6. Demonstrate understanding of basic historical concepts.	82	1.3	.9	2.3	.8	85	.8	.6	1.9	.7
7. Compare and contrast various interpretations of historical events.	92	1.0	.9	2.3	.8	92	.7	.6	1.9	.9

TABLE 5.4 (Cont'd)

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
AVERAGE LEVEL OF STUDENTS' COMPETENCE AT ENTRY AND EXIT

	History					Histoire				
	% Teaching Topic	Entry		Exit		% Teaching Topic	Entry		Exit	
		$\bar{X}$	SD	$\bar{X}$	SD		$\bar{X}$	SD	$\bar{X}$	SD
8. Identify bias.	82	1.6	.9	2.6	.9	78	.9	.8	1.9	1.0
9. Assess an argument in terms of available evidence.	86	1.5	.8	2.6	.8	92	.9	.8	2.1	1.1
10. Define a historical problem by means of an assessment of appropriate information.	88	1.0	.7	2.2	.7	100	.9	.7	2.1	.8
11. Assess events in terms of their historical context.	90	1.2	.8	2.4	.8	100	.7	.7	2.0	.6
12. Analyze the characteristics of a particular period, problem or theme in history	84	1.4	.8	2.4	.8	92	1.0	.7	2.1	.7
13. Use historical concepts and information in order to understand contemporary issues.	90	1.1	.8	2.3	.7	85	.7	.6	1.8	.7

In many areas the mean level of competence expected at entry is below 1 (that is, minimal competence). By the end of the course, the perceived competence level has risen by approximately one category; in most areas teachers indicated that students had achieved moderate competence or even a little better.

Over 63 percent of the history teachers were attempting to develop all skills listed, and all the skills but six were given some attention by at least 75 percent of the respondents. The mean entry level of student competence perceived by teachers of the course in all these skill areas does not exceed 2.5. Thus, teachers seem to be saying that when one thinks of the group of year 5 history students, the level of competence generally upon entry to the course is a little higher than minimal. After taking the course, competence has risen by approximately one degree, that is to a level midway between "moderate competence" and "competence in varied situations, displaying some originality". Considering the fairly narrow span of the response key (from 0 - no competence to 4 - mastery), the response levels indicated by teachers are not unexpected, particularly when directions emphasized that teachers were to think of the "average level of competence".

3. TEACHING METHODS

(a) Instructional Techniques

The Socratic method was used extensively by 98 percent of history teachers and 86 percent (12) of histoire teachers; over half of the teachers in history used it for over 20 percent of in-class time. However, histoire teachers tended to use this technique less; 50 percent indicated they used it between 10 and 25 percent of the time This method was supplemented by a variety of other techniques which 70 percent of the history respondents appeared to have utilized between 1 and 10 percent of the time: lectures, small group activities, classroom study, testing, audiovisual techniques, and seminar/tutorial. The lecture appeared to be utilized more frequently in histoire; 9 of the 14 respondents indicated that they used it for 15 percent

TABLE 5.5
SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
TEACHING METHODS

Method	% of Teachers Using for % Range of Time									
	History					Histoire				
	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%
Lecture	12%[a]	64%	10%	8%	6%	14%	22%	14%	14%	36%
Socratic	2	16	32	8	42	14	29	29	21	7
Small group activities	30	58	8	2	2	29	50	21	0	0
Seminar, tutorial	16	46	16	8	14	14	64	22	0	0
Classroom study	18	64	14	4	0	14	43	36	7	0
Individualized instruction	84	14	0	2	0	86	14	0	0	0
Simulations, games	60	38	2	0	0	64	36	0	0	0
Student presentations	36	58	6	0	.0	36	57	7	0	0
Testing	2	92	6	0	0	0	100	0	0	0
Library Research	42	52	6	0	0	7	64	29	0	0
Audiovisual	8	80	12	0	0	93	7	0	0	0
Field Trips	56	42	2	0	0	57	43	0	0	0

[a]Percentage of teachers.

or more of class time; five respondents indicated that they used it over one-third of the time. The amount of classroom study which takes place in histoire varied: although one instructor indicated that he did not use classroom study the rest did; over 50 percent (8) utilized 10 to 20 percent of class time for this purpose. Simulations, games and field trips, visits by resource personnel are techniques which fewer than 50 percent of histoire/ history teachers employed. When these techniques were used, they took less than 10 percent of class time. For those who had student presentations in their class (58 percent of history teachers, 64 percent of histoire teachers), such presentations formed 10 percent or less of class time. (See Table 5.5)

Approximately one-third of those teaching history and 29 percent (4) of those teaching histoire indicated that their courses permitted students to progress at individual rates. However, those who did individualize did so only minimally. The respondents may have been referring to classroom study or independent research, for the majority did allot some time to classroom study, which may include individual help to particular students; this perhaps was interpreted as individualized instruction.

Histoire teachers conducted by far the greatest part of their class instruction in French: 11 (79 percent) indicated 100 percent of the time, and none used it less than 90 percent of the time.

(b) Out-of-Class Work

To supplement work done in class, students usually are expected to do some homework. Seventy-four percent of the history and 50 percent of histoire teachers indicated that they expected between three-quarters of an hour and two hours' work for every hour of class time. The majority of teachers did not expect more than one hour's work out of class for each hour in class. Many (40 percent of history, 43 percent of histoire teachers) expected less.

(c) Use of Resources

Paralleling the variety of instructional techniques utilized, a variety of resource materials are used by each teacher in a manner consistent with the emphasis placed upon the objectives of the course. For instance, in order to achieve the objective "compare and contrast various interpretations of historical events", use of two or more texts, documents, reference books is appropriate. Although audio-visual media, mimeographed materials, magazines, information kits, etc., were utilized by almost all teachers, these resources are not basic to year 5 history. With the great variety of materials utilized in the presentation of the course, 2 or more texts perhaps provide further source material rather than form the basis for the teaching of the course. In histoire, mimeographed materials replaced texts as the basic resource; perhaps this is related to the fact that Circular 14, (a Ministry guideline which recommends lists of texts), does not list many French texts for Canadian history: perhaps teachers of histoire find materials already in print inappropriate, insufficient, or too costly.

Every histoire teacher who used a main text with great consistency indicated that he used Canada, Unité et Diversité by Cornell, Hamelin, Ouellet, Trudel, (Holt, Rinehart, Winston 1968). Only two of the nine included a second title.

Among the texts used in history, three names turned up with the greatest frequency: Canada and the United States (1963) by R. Cook and K. McNaught, Changing Perspectives in Canadian History (2nd ed., 1967) by K. A. MacKirdy, J. S. Moir, and Y. F. Zoltvany, and Challenge and Survival: The History of Canada (1970) by H. H. Herstein, L. J. Hughes and R. C. Kirbyson.

TABLE 5.6

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
TEACHING RESOURCES

Resource	Use by % of Teachers							
	History				Histoire			
	Great	Moderate	Small	Not at all	Great	Moderate	Small	Not at all
Main text	33%	40%	22%	5%	7%	36%	50%	7%
Main text plus supplementary texts	46	28	22	4	29	43	14	7
Two or more main texts or materials from other texts	50	23	19	8	36	29	7	7
Reference books, dictionaries, encylopedias, etc.	46	28	24	2	29	35	29	7
Documents, journals, scholarly reviews	32	38	24	6	43	50	7	0
Individualized learning packages	0	7	20	73	0	29	14	57
Other classroom resources	12	40	40	8	14	57	29	0
Audiovisual media	8	48	34	10	0	43	57	0
Mimeographed materials	29	30	29	12	57	36	7	0

4. ASSESSMENT OF STUDENT WORK

The proportion of the final mark which is allotted to each type of student assessment should reflect the emphasis teachers place upon the objectives of the course, for most students direct their major energies to those areas of the course which will be awarded the greatest proportion of the final mark. (See Table 5.7)

The final examination has decreased in emphasis both in history and histoire. In 68 percent of the history courses and 35 percent of histoire courses studied, exemption from writing the final examination was possible. The basis for exemption varied: 4 of the 5 teachers in histoire and 18 (36 percent) of the 34 in history required an average of 60 percent during a year's or semester's work, accompanied by a teacher's recommendation. Five history courses required only 50 percent; one histoire course required 65 percent.

In those courses where exemption was not possible (4 in histoire; 16 in history) the final examination in all but one instance in history and in histoire accounted for less than one-third of the final mark. Mid-term examinations and other written tests used in 24 history courses and 8 of the histoire courses received 40 percent or less of the final mark.

As one might expect, individual papers (essays, reports) received some weight in the final mark; but the emphasis varied. The majority (56 percent of history courses; 89 percent of histoire courses) allotted student papers from 20-40 percent of the final mark. When one recalls the emphasis placed upon development of analytic and interpretive skills and writing ability, the weighting placed upon individual papers becomes understandable. Most history courses did not assign marks for effort; as one respondent commented "effort is revealed by the evaluation in all areas". In half of the histoire courses between one and ten percent of the final mark was assigned for effort, providing some leeway for the teacher to assess and award marks for some of the intangibles which the histoire teacher seeks to develop (according to responses in the aims section--see item 17.1-4). Assessment of group work was minimal at year 5 level; in the 16 history courses and 9 histoire courses where group effort was awarded a mark, it received less than 20 percent of the

TABLE 5.7

SECONDARY SCHOOL HISTORY/HISTOIRE YEAR 5
ALLOCATION OF FINAL MARK

Item	Allocation By % Ranges									
	History					Histoire				
	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%
Final examination	79%[a]	2%	11%	6%	2%	46%	15%	15%	8%	15%
Mid-term examination	15	8	21	29	27	33	-	33	17	16
Other written tests	10	6	33	35	16	-	7	50	29	14
Other oral tests	88	10	2	-	-	67	25	8	-	-
Individual papers (essays, reports, book reports, etc.)	2	11	17	31	39	-	8	54	30	8
Group or team papers	77	19	2	2	-	19	72	9	-	-
Individual projects (exclusive of essays, reports)	61	23	8	4	4	8	75	17	-	-
Group or team projects	67	27	4	2	-	25	67	8	-	-
Class participation	36	54	8	-	2	33	58	8	-	-
Effort	73	27	-	-	-	42	58	-	-	-
Attendance	75	25	-	-	-	64	36	-	-	-

[a] % of teachers in each % range

final mark. Thus, the student's final mark appears to be derived from a number of sources. Written tests and student presentations accounted for the major part of the final mark; assessment of student's skills; knowledge encompassing a complete year or semester's work appeared to bear only lightly, if at all upon the composition of the final mark.

D. Discussion

1. *EXTENT OF VARIABILITY*

Respondents perceived a great deal of variability in the competencies of the students in their courses. One histoire teacher commented "les groupes d'étudiants sont comme le vin, il y a de bonnes années et il y en a des néfastes." This perception is more understandable in histoire, where most year 5 courses do not have prerequisites; one wonders why a similar response is so widespread in history when the majority of courses seem to require at least one history prerequisite.

The year 5 courses appear to be similar in content and in the skills they attempt to develop; however, emphases upon certain themes, problems, and the development of general attitudes differed somewhat in history and histoire. A wide range of teaching techniques and resource materials were utilized to differing degrees in each course. The extent to which this contributes to variability is a moot point. One would expect that resources like mimeographed materials and documents would vary greatly from one teacher to the next in content as well as in difficulty level and usage. There appears to be considerable variation in the way in which students were assessed and final marks derived. Few (more in histoire) courses required the student to write the final examination; when final examinations were written, the marks awarded did not form a major part of the student's final mark. To the extent that other types of assessment form a proportion of a final mark, variability may exist in numerous ways: the amount of material which the student is required to recall; the difficulty of the assignment; the amount of time given for completing the assignment;

the standards required for successful completion; the nature of the marking scheme--all these are areas which may vary greatly from one course to the next and one assignment to the next. The greater the number of assignments or assessments, the greater the potential for variability.

If teachers are attempting to assess "intangibles" or areas which are inherently difficult to measure (e.g. effort, class participation, sense of responsibility), assessment may vary with each teachers' basic assumptions regarding the way in which to measure these and with the extent to which they form part of the final mark.

2. *FACTORS AFFECTING VARIABILITY*

Different prerequisites for courses, leading to some differences in student backgrounds, appear to be a major influence upon variability at the secondary level. The use of many texts, documents, etc., as resource material, the organization of the course around a series of problems or themes, increased freedom for each teacher to present the type of course he/she thinks appropriate--all these factors promote variability. In addition, increased freedom and encouragement for the teacher to accommodate all student competencies permit the good students to become even better, thus widening the spread of student competencies and increasing the variability. When one considers the fact that the teacher also sets his own standards for successful completion of the course, one is tempted to conclude that great variability exists in the standards which are set for successful completion of the course.

UNIVERSITY HISTORY/HISTOIRE YEAR 1

A. The Sample

The information to be reported is derived from questionnaires filled in by university instructors of selected first year history/histoire courses, from interviews with department chairmen of history at 10 universities, from Ministry records concerning enrolments, and from university calendars describing first year history/histoire course offerings. The courses offered by the universities selected for the study have been considered to be the population of courses from which a representative sample was selected.

1. *POPULATION OF COURSES*

The French-language counterpart to history, histoire, is offered at 2 universities in the sample of universities. One university offers 3 courses, the other 4. However, although the 4 courses appear in the university calendar, only one appears to be offered each calendar year. Therefore, from the population of 4 courses at the two universities, three were chosen. Due to the small number of histoire courses offered, only a small number could be selected; because only 3 courses were involved in this description, percentages would not be meaningful and will not be employed. Much of the information describing history courses parallels information given by histoire instructors. However, when this information differs, it will be reported.

University history departments are offering a variety of courses to first year students. Some form of European survey course is offered by every university. This course is supplemented by at least one other course in the smaller universities and by as many as seven other course offerings in two of the larger universities (See Table 5.9). In the late 60s the number of course offerings increased, perhaps because of the general expansion which took place at universities at this time to accommodate the increasing numbers desiring university education. Additional professors, hired in the late 60s probably have a great deal to do with the present diversification evident in

course offerings. Though proportional enrolments in history departments have decreased since a peak in 1969 - 71, the number of courses offered, with few exceptions, has remained the same.

TABLE 5.8

UNIVERSITY HISTORY YEAR 1
ENROLMENTS IN HISTORY YEAR 1 AS A PERCENTAGE
OF TOTAL YEAR 1 UNIVERSITY ENROLMENT

	1965/6	1968/9	1969/70	1970/1	1971/2	1972/3	1973/4	1974/5
University A			3.6%	3.2%	2.6%	2.5%	2.3%	2.5%
University B			5.1	5.2	3.7	3.7	4.0	3.8
University C				2.1	1.5	0.3	0.9	1.3
University D	5.5	2.2			2.7		1.9	1.9

One history department chairman commented that the presence of numerous first year courses may be explained as an attempt to attract students and that some of the courses were created primarily because of student demand. It is worth noting, in view of the stress on skill development in the secondary schools, that 3 of the 10 universities sampled contained a "history skills" course among their offerings. Perhaps this type of course may be attributed to student needs as perceived by university faculty.

2. *NATURE OF COURSES SAMPLED*

TABLE 5.9

UNIVERSITY HISTORY/HISTOIRE YEAR 1
COURSES IN THE SAMPLE

Emphasis in course	History				Histoire	
	Courses offered		Courses selected		Courses offered	Courses selected
	N	%	N	%	N	N
European history	10	24	9	40	2	2
Canadian history	4	9	4	18	1	1
British history	3	7	0	0	0	0
North and South American History	2	5	1	5	0	0
United States history	1	2	1	5	0	0
3rd world countries	2	5	1	5	0	0
*Thematic	20	48	6	27	1	0
Total	42	100	22	100	4	3

*When the course was organized by theme and dealt with many countries coincidentally, it appears in the "thematic" category. The "thematic" category also includes skills courses, that is, courses emphasizing development of history skills.

The sample selected from the population of courses offered in first year is heavily weighted on the side of the European survey course. Since this course was offered by every university, its selection for the sample provided a common pool of courses useful for analysis. Canadian history courses were selected as a second pool of courses because of the attention currently being paid to students' knowledge of Canadian history and also because its content related to the content of most year 5 courses. Unfortunately this resulted in the selection of a smaller proportion of courses from the "thematic" grouping. However, many of the courses with an emphasis upon study of a country focussed on one or two themes, and in this sense they may be considered to be thematic courses.

The main organizational approach utilized by 45 percent (N=9) of the respondents is thematic; an additional 35 percent indicated that their courses were organized according to a series of problems. Because of the nature of the subject, chronological order, or ordering by period or era, becomes a logical but primarily secondary

organizing device. All courses offered with a Canadian emphasis utilized a problems approach. Three of the fourteen courses with a European history emphasis were organized primarily via chronology or periods.

The organizational approach in histoire for 2 of the 3 courses (including Canadian histoire) was chronological, by period or era. The modern European course was thematic in approach.

B. Factors Influencing the Teaching of the Course

1. *BACKGROUND OF THE INSTRUCTORS*

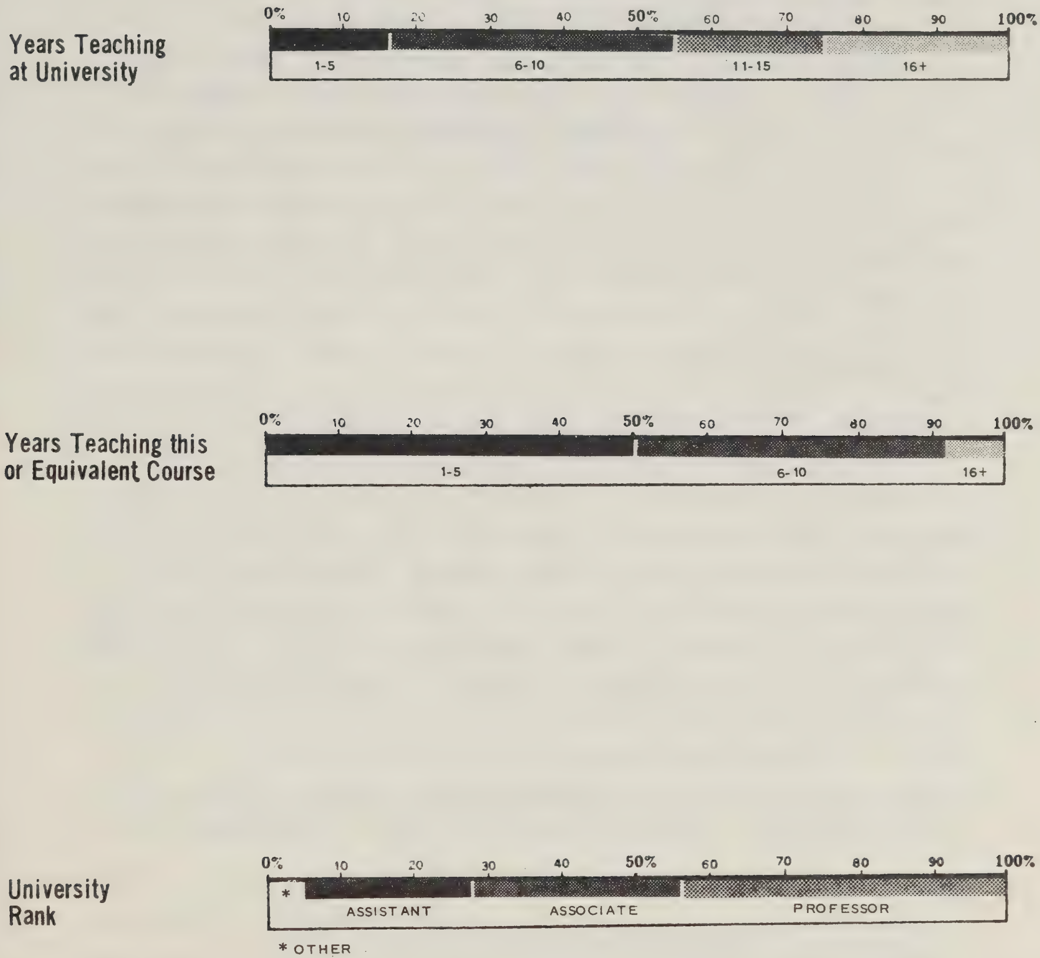
In addition to their university experience all histoire instructors had previous experience at the secondary school level; one had instructed at the college level; one instructor received most of his teaching experience in Quebec. Since French-language university programs in Ontario have been encouraged by the federal government only since 1968, histoire instructors have not been teaching their courses for nearly as long as history instructors. In all other respects, the 3 instructors present a picture of experience and expertise in their field similar to history instructors.

These first year history courses are clearly taught by a group of highly qualified, experienced instructors. Eighty-five percent of respondents held the Ph.D. degree. Since over half of the instructors had taught for 8 years or more, they have taught students who entered university after successful completion of the now abolished grade 13 external departmental examinations, as well as the more recent students who entered university on the basis of completion of 33 credits, six of which are at the year 5 level. These instructors also taught in the high-enrolment years of 1969-71, and in the years before financing of universities based upon student enrolment . They thus responded from a vantage point which permitted them to compare the present system and students with those of the mid-1960s. It is, therefore, interesting to note that the variation in responses by these experienced instructors is similar to the variation in perceptions

Figure 9

BACKGROUND OF INSTRUCTORS

UNIVERSITY HISTORY YEAR 1
PERCENTAGE OF INSTRUCTORS IN EACH CATEGORY



of instructors who had taught for fewer than 10 years. Although half of the respondents taught the sampled course for 5 years or less, only 2 professors were teaching their courses for the first time. Moreover, the number of years for which a course has been taught may more often reflect the age of the course, than the experience of the instructor. Courses related to Canadian history, emergence of the Third World countries, and those defined in this report as thematic appear to be relatively new. Most instructors perceived their own special interests or training as the prime factor influencing the teaching of the course (see Table 3). Since every university but one grants each instructor almost total autonomy in presenting his course this seems substantially accurate. Courses were, moreover, largely unaffected by the need of instructors to coordinate their efforts with other staff. In most cases instructors perceived it necessary only when more than one instructor was teaching the same course.

2. *PREREQUISITES OF THE COURSES*

Respondents indicate that there are no prerequisites related to previous experience in history or histoire. As one instructor commented, "If the students have developed general competence in reading, writing, and analysis, they should be able to cope with first year history courses". Although students with previous knowledge and experience in history usually have an advantage, university instructors seem to accept the situation as it exists. A student possessing a secondary school honours graduation diploma, accepted as a student by the university, is eligible for first year history. One university presents a course which it has labelled a prerequisite for other university history courses; some universities strongly advise students intending to take a concentration in history to take certain first year history courses. However, the final decision is the student's.

3. *QUALITY OF PREPARATION OF INCOMING STUDENTS*

Instructors were asked to rate the quality of preparation of incoming students. Although some were reluctant to generalize (23 percent, N=5),

the rest did assign a rating. A rather more even distribution resulted than was the case with secondary school teachers. Fifty-nine percent of instructors rated the quality of students as "fair", 12 percent as "poor"; 29 percent were prepared to consider the quality of incoming students as "good", although none went so far as to rate them "excellent". Considering the difficulty inherent in attempting to rate a group of students, it is perhaps not unexpected to find the majority of the responses in the "fair" category. Respondents were encouraged to comment further upon the quality of preparation, both in areas where they perceived that students were well-prepared and those areas where they thought students might have been better prepared. Those who commented positively remarked upon students' interest in the course, their eagerness to learn, and their willingness to work. Those who thought students should be better prepared cited some students' lack of knowledge in history; others wrote that skills specific to the area of history were poorly developed. Lack of a history prerequisite may perhaps explain these comments. However, lack of adequate preparation in basic skills of communication (oral and written), analysis, and reading were cited most frequently by those who commented negatively (17 of 19 responses).

Histoire instructors perceived preparation of their students in much the same way as history instructors. An additional comment by one histoire instructor is worth noting: "On ne les a pas habitués au travail intellectuel". An additional complication lies in the educational background of histoire students. One instructor indicated that at least one-half, perhaps two-thirds of his students came from Quebec, and that the extent of their training in history was very variable.

4. VARIABILITY OF INCOMING STUDENTS' COMPETENCIES, INTERESTS, PROGRAMS, AND CAREER PLANS

One factor which every respondent commented upon was the variability in competencies of incoming students. One history department chairman stated that "the good students were better than ever, the poor students were illiterate, and generally speaking the competence of the 'average'

student was somewhat lower than ten years ago". Another instructor commented that "the background in history of incoming students may vary from those students who have taken a concentration in history and/or closely related subjects, to those students who have not taken history since grade 9 or 10". The problem is evident in histoire courses as well. One instructor stated of Quebec students that, in courses that may run to 80 or even 110 students, "Plusieurs ne savent rien de l'Europe historique et géographique. Certains ont eu 3[e] année ou 5[e] année de bac. et ont déjà suivi des cours d'histoire de l'Europe plus avances que le mien!" When this variability in background/training is combined with the variability resulting from inherent differences in students' abilities, it is understandable that 82 percent of instructors thought the competence of incoming students was very variable, and a further 18 percent thought it moderately variable. Since universities are now funded according to number of students enroled, there may be some tendency to attract and admit students for which university programs and courses are not suitable, thereby increasing the variability. Although students in first year history courses may come from many different program areas, and their plans for future careers may be equally variable, 53 percent of the instructors indicated that this variability did not influence their teaching of the course. At the other extreme 11 percent indicated that this variability influenced their teaching to a great extent.

5. *OTHER FACTORS INFLUENCING THE TEACHING OF THE COURSE*

Most respondents indicated that assigned course outlines either did not apply to them or were no influence at all upon the teaching of their course. Four instructors (21 percent) did claim that assigned course outlines influenced them "a great deal". One was a visiting professor, who used a course outline developed by the person whose place he was taking. Forty-four percent (N=8) of the respondents were not influenced by a principal text(s), perhaps because their courses did not employ "principal" text(s). Yet 33 percent did use and were influenced to a moderate or great extent by the content and approach of a principal

text. One histoire instructor was influenced to a great extent by the principal text he used because he was in the process of completing it for publication.

Only 25 percent (4) of those who responded indicated that some coordination necessitated by other faculty teaching the same course influenced their teaching of the course. Others who responded positively to this item cited the fact that there was no one else to teach the course; the task, then, was given to them.

The relative importance of the factors influencing the teaching of the course is summarized in Table 5.10.

TABLE 5.10

UNIVERSITY HISTORY YEAR 1
FACTORS INFLUENCING THE TEACHING OF THE COURSE

Factor	WM[a]	R[b]
Interests of students	2.2	2
Students' knowledge	1.4	3
Relationship to concurrent courses	0.6	8
Information on future plans	0.9	7
Assigned course outline	1.1	5
Teacher's special interests or training	2.5	1
Principal text(s)	1.1	5
Staffing	1.4	3

[a]WM= weighted mean. Each category was assigned a weighting: 0-not at all, 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the product totalled and a mean derived by dividing by the number of respondents.

[b]R=rank. Factors were ranked on the basis of weighted means.

C. Characteristics of the Course

1. AIMS OF THE COURSE

Respondents were asked to rate each of 21 general aims according to the emphasis they placed upon it in their course. As might be expected, aims dealing with the development of history skills received the greatest emphasis by the most respondents (see items #2, 4, in Table 5.11). Aims which produced a split in the opinions of instructors deal with awareness of the individual's relationship to society, "cultural diversity", and "understanding the relationship between historical events and contemporary issues". However, virtually all of the respondents placed moderate or great emphasis upon the development of "skills required for preparation and presentation of written work". Other aims which received a great deal of emphasis were related primarily to interests and attitudes about history and quality of work. It would probably be difficult for any university instructor to respond other than positively to an item such as "encourage high scholastic standards" or "increase student's interest in history".

One might expect some difference of emphases in histoire courses because of cultural differences which a minority group might be attempting to retain. Thus the aim "appreciate one's cultural heritage" received more attention in histoire courses, as did the aim "develop respect and tolerance for diverse opinions and ideas". There also seems to be greater emphasis upon awareness of one's societal responsibilities (as in item #7; #17.4). Another aim receiving attention in the histoire courses deals with the acquisition of "a specific body of historical information". Considering the comments histoire instructors have made concerning prerequisites, quality of preparation, and the variability in student's background, this emphasis is understandable.

TABLE 5.11

UNIVERSITY HISTORY YEAR 1
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	WM[a]	R[b]
1. Acquire a specific body of historical information	1.9	10
2. Develop skills required for analysis and interpretation of historical information	2.7	1
3. Develop the ability to examine a historical problem from a variety of perspectives	2.5	7
4. Consider historical issues in terms of the context of the time	2.6	3
5. Understand the relationship between historical events and contemporary issues	2.0	9
6. Develop an awareness of the complexity of historical issues	2.5	7
7. Develop an awareness of one's relationship to society	1.5	18
8. Develop an awareness of the growing interdependence of nations and people in the modern world	1.3	20
9. Appreciate one's cultural heritage	1.7	13
10. Develop an awareness of the diversity of cultures	1.9	10
11. Develop the skills required for preparation and presentation of written work	2.6	3
12. Develop skills required for preparation and presentation of oral work	1.6	15
13. Encourage high scholastic standards	2.6	3
14. Develop an attitude which promotes critical assessment of new information	2.6	3
15. Develop an awareness of the approaches employed by related disciplines (e.g. economics, political science, sociology)	1.6	15
16. Increase student's interest in history	2.7	1
17.1 Develop respect and tolerance for diverse opinions and ideas	1.9	10
17.2 Develop independence; sense of responsibility	1.7	13
17.3 Develop self-confidence	1.6	15
17.4 Develop social conscience	1.5	18
17.5 Develop social skills (ability to work and interact with others)	0.9	21

[a] WM=weighted mean. Each category was assigned a weighting: 0-not at all, 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the product totalled and a mean derived by dividing by the number of respondents.

[b] R=rank. Factors were ranked on the basis of weighted means.

2. THE OBJECTIVES OF THE COURSE

The items included in this section of the questionnaire were described as specific objectives and were primarily skill objectives. They were classified under four headings: research, writing, oral, and, analytic and interpretive. Respondents were asked to indicate the average level of competence of their incoming students at the beginning and end of the course, and then to express their preferences: the level of competence they would have preferred to see at the beginning and end of the course. Given the comments concerning the variability in training of incoming students, and the lack of history prerequisites for first year courses, it is not surprising to find that most instructors indicated a low level of average competence. When one computes the mean of the responses for each item, the competence level at entry does not reach 2 (i.e., moderate competence). All means are above 0, (i.e., no competence at entry), but many hover between "no competence" and "minimal competence" levels when the standard deviation is taken into account.

In histoire, in all but 3 areas, competence expected was given a rating of "0" or "1" (that is, no competence, or minimal competence). By completion of the course, instructors expected moderate competence for those areas which they treated. In only 2 areas did 2 histoire instructors expect higher than moderate competence by the end of the course (that is, in the ability to make effective use of historical references; in the ability to comprehend the text). One histoire instructor indicated that his course was not concerned with the development of any oral objectives. Certain analytic and interpretive objectives received treatment by only two of the three instructors (Items 1.3, 2.1, 2.2, 4, 8, 9, 10, 12 and 13 of Part D of the Objectives section of the questionnaire). However, one instructor indicated that his course did not utilize small group work, or seminars/tutorials, although the socratic method was employed. It may be because of the nature of presentation of the course that certain objectives were not treated (example: development of oral skills). Yet, considering that in many areas the incoming level of competence was described as "no competence", histoire instructors intend to do a great deal with their students during the course.

TABLE 5.12

UNIVERSITY HISTORY YEAR 1
LEVEL TO WHICH TOPICS ARE TAUGHT

Item	% Teaching Items	Entry $\bar{X}$ [a]	Entry SD	Exit $\bar{X}$	Exit SD
A. Research					
1. Use libraries effectively (card catalogues, reference materials, encyclopedias, etc.)	75	1.2	.8	2.3	.7
2. Locate historical references (archives, government records, etc.)	55	.6	.7	1.5	1.0
3. Make effective use of historical references	85	1.0	.6	2.2	.7
4. Distinguish between primary and secondary sources.	80	.7	.7	2.2	.7
B. Writing					
1. Demonstrate facility in planning and organizing written materials.	90	1.1	.7	2.3	.6
2. Use clear, concise prose necessary for the written presentation of concepts (essays, reports)	75	.9	.6	2.0	.5
3. Use effective note-taking techniques.	70	1.0	.8	2.1	.6
4. Apply historical terminology appropriately (e.g. Renaissance)	80	.8	.7	2.2	.5

[a] Items were rated on a scale: 0-no competence; 1-minimal competence; 2-moderate competence; 3-competence in varied situations, some originality; 4-mastery, competence in high-level, creative situations.

TABLE 5.12 (Cont'd)

UNIVERSITY HISTORY YEAR 1
LEVEL TO WHICH TOPICS ARE TAUGHT

Item	% Teaching Items	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
5. Use appropriate conventions related to acknowledging references (e.g., footnotes, bibliography)	85	.8	.8	2.0	1.0
C. Oral					
1. Explain concepts clearly	80	1.0	.8	2.0	.8
2. Present an extended argument effectively	70	.6	.6	1.6	.9
3. Present a prepared report	55	.9	.6	1.9	.9
4. Contribute effectively in a small group discussion	60	1.4	.8	2.2	.8
D. Analytic and Interpretive					
1. Comprehend a variety of historical sources:					
1.1 documents	60	.4	.5	1.5	.8
1.2 monographs	85	.8	.6	1.9	.5
1.3 texts	65	1.2	.6	2.1	.6
2. Analyze material read in terms of:					
2.1 identification of main thesis or argument	100	.8	.6	2.0	.8
2.2 identification of significant/ pertinent information	90	1.2	.6	2.3	.7

TABLE 5.12 (Cont'd)

UNIVERSITY HISTORY YEAR 1
LEVEL TO WHICH TOPICS ARE TAUGHT

Item	% Teaching Items	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
3. Present an argument effectively in terms of organization, substance, (supportive factual material) logical conclusions	100	.8	.6	2.1	.7
4. Distinguish between essential and non-essential information	80	1.0	.6	1.9	.6
5. Distinguish between fact and interpretation	95	.8	.6	2.1	.6
6. Demonstrate understanding of basic historical concepts	90	.7	.5	1.9	.5
7. Compare and contrast various interpretations of historical events.	85	.6	.6	1.9	.6
8. Identify bias	85	.8	.7	2.1	.7
9. Assess an argument in terms of available evidence.	85	.7	.6	1.9	.6
10. Define a historical problem by means of an assessment of appropriate information	80	.5	.6	1.8	.7
11. Assess events in terms of their historical context	90	.6	.6	2.1	.6
12. Analyze the characteristics of a particular period, problem or theme in history.	85	.7	.7	1.9	.5
13. Use historical concepts and information in order to understand contemporary issues	75	.6	.5	1.9	.5

3. TEACHING METHODS

(a) Instructional Techniques

After examining the aims and objectives of the course, the next step is to examine the methods instructors are using to achieve their goals (Table 5.13). The lecture, accompanied by a seminar or tutorial, is still the basic pattern for presentation of the course. If skill development is one of the major emphases in most courses, one wonders how effective the lecture presentation can be in achieving success in this area. Perhaps instructors do not perceive a relationship between course presentation and the development of skills, since student papers and presentations form a major part of every course. The amount of time given to the tutorial or seminar does vary. In three of the courses sampled the tutorial was the major mode of study utilized. Because tutorials normally demand student participation, most often both written and oral, it is perhaps in tutorials that most students' skill development is given attention.

In four of the courses an equal amount of time was set aside for lectures and tutorials, but in 13 of the courses the amount of time spent in the lecture hall outweighed the amount of time set aside for the seminar or tutorial. Two courses offered lectures only. One histoire course offered lectures only. There does not seem to be any relationship between the type of teaching technique used and the nature of the course. Each instructor seems to make his own decision with respect to the mode of presentation. Both survey and thematic or "problems" courses were found in all the variations mentioned. Audiovisual aids were utilized only a little. Eight respondents indicated they used them, and only 2 used them more than 10 percent of the time. Aside from a small amount of time taken for testing purposes, the Socratic method was the only other approach utilized in history but by no means as extensively as in year 5 secondary school.

In histoire, one course utilized audiovisual techniques and field trips, visits by resource personnel but only minimally. All 3 courses employed French 100 percent of the time.

TABLE 5.13

UNIVERSITY HISTORY YEAR 1
TEACHING METHODS

Method	% of Instructors Using for % Range of Time				
	0%	1-10%	11-20%	21-30%	31+%
Lecture	0%[a]	0%	9%	19%	72%
Socratic	38	19	29	14	0
Small group activities	90	5	5	0	0
Seminar tutorial	9	4	18	32	37
Student presentations	84	11	0	5	0
Testing	31	58	11	0	0
Audiovisual	62	28	5	0	5
Field trips, etc.	100	0	0	0	0

[a]Percentage of instructors

One instructor commented that students whom he found to need assistance in order to improve writing skills were assisted on an individual basis. An item which asked the respondents to comment upon the extent to which their courses were individualized (permitting each student to proceed at his own rate) may have been interpreted by some respondents as the extent to which individual attention was given to students, since 43 percent of the instructors responded in the affirmative, most indicating "to a small extent".

Most instructors expected their students to spend some time outside of class on the subject. However, there was quite a bit of variation in the amount of time expected. Thirteen of the 21 respondents expected between one and three hours' work outside the class for every hour of class time. Four instructors expected more than 3 hours of work for every hour of class time. One instructor indicated, that although he did not know the amount of time students spent on the course outside of class, workload ratings (rating the amount of work students were required to do for the course) for his course, given by students, were considered "average". Courses classified as primarily thematic seemed to require the most out-of-class work, according to instructor estimates. However, it must be remembered that the amount of time indicated by the response to this question is approximate at best.

(b) Use of Resources

The types of resources utilized by the majority of respondents reflect the emphasis placed in the replies to the questionnaire, upon the development of interpretive and analytical skills (Table 5.14). In history, 80 percent of the respondents employed two or more main texts, and supplementary materials from other texts; 86 percent used documents and journals; reference books and encyclopedias were used a little. Audiovisual materials were used in one course to a great extent, but most courses (N=18) did not use them at all. Use of newspapers and magazines was not perceived as appropriate for university history work.

TABLE 5.14

UNIVERSITY HISTORY YEAR 1
TEACHING RESOURCES

Resource	Use by % of Instructors				
	Great	Moderate	Small	Not at all	N/A
Main text	6%	22%	11%	28%	33%
Main text plus supplementary texts	30	20	0	20	30
Two or more main texts or materials from other texts	48	29	5	14	5
Reference books, dictionaries, encyclopedias, etc.	5	30	45	15	5
Documents, journals and scholarly reviews	24	38	24	4	10
Other classroom resources	0	0	10	80	10
Audiovisual media	4	0	10	76	10
Mimeographed materials	11	5	16	63	5

In histoire, reference books, dictionaries, encyclopedias were used extensively; documents, journals and scholarly reviews were used not at all by one instructor, only a little by a second, and to a great extent by the third. Mimeographed materials were employed a great deal in two of the courses. However, one instructor indicated he used this resource a great deal because he was in the process of developing a text for his course. Magazines, information kits, newspapers etc. were utilized to some extent by 2 of the 3 instructors.

Although only 12 respondents actually listed the texts they used, 5 others indicated that they used many texts. All courses were using different texts, though there was some duplication of authors. The range of material used was great, from Machiavelli's Prince to Cornell et al., Canada: Unity in Diversity (1967).

Since the 3 histoire courses dealt with different content, it is to be expected that different texts would be used. It is interesting to note, however, that the course offered in Canadian history employed the same text used in French-language secondary school year 5, namely, Cornell et al., Canada, Unité et Diversité (1971).

4. *ASSESSMENT OF STUDENT WORK*

In only two history courses in the sample were exemptions from writing the final examination possible. Exemption for one course was based upon a large amount of written work submitted over two terms; the other course permitted exemption only "rarely". One course assessed its students by means of three tests, one of which was final, and by individual papers (See Table 5.15). Seventeen of the 21 awarded some part of the final mark for class or tutorial participation, but this category was ambiguous in a university setting. It was unclear whether marks were being awarded for student participation in tutorials or whether students received marks for participation in the lecture hall. Perhaps this category was used as a 'blanket' to cover any participation in the course by students, excluding written work. At any rate, this category of assessment appeared to be a recent addition at the

university level.

The weight given to individual papers ranged from a low of 21 percent for lecture-tutorial format to a high of 65 percent for a course presented with more time given to tutorials/seminars. A student received anywhere from 5 percent to 40 percent of his final mark for class participation. However in seven of seventeen courses 10 percent of the final mark was given to class participation and in only one case was more than one-third of the mark given to class/tutorial participation.

TABLE 5.15

UNIVERSITY HISTORY YEAR 1
FINAL MARK ALLOCATION

	Allocation By % Ranges				
	0%	1-10%	11-20%	21-30%	31+%
Final examination	13%[a]	0%	5%	41%	41%
Mid-term examination	40	30	20	10	0
Other written tests	61	17	0	17	5
Individual papers	0	0	0	23	77
Class participation	19	43	19	9.5	9.5
Effort	93	7	0	0	0
Attendance	94	6	0	0	0

[a] % of instructors in each % range

D. Discussion

Although there appears to be a great deal of variability in the content of the courses described in university calendars, responses to the aims and objectives section of the questionnaire indicate that most instructors are attempting to develop competence in communication at a very basic level, and skills of logic, analysis, and interpretation that are relevant to the study of history. The means which they use to achieve

these objectives vary somewhat, for example, in the extent to which seminars/tutorials are used. There is considerable consistency concerning the types of materials employed, especially in the use of many different kinds of written materials, ranging from documents and encyclopedia to texts. Assessment of students' work and the weight which is given to various kinds of work (tests, examinations, class participation) differ from one course to another.

Although there were only 3 courses studied in histoire, the extent to which they vary is considerable. They are different in content. One course appears to be a duplication of year 5 secondary school histoire (perhaps for students from Quebec who may not have taken the course?). There seems to be variation in terms of the skills which instructors hope to develop; although there is agreement concerning some skill objectives (for example: the development of writing skills) a considerable group of objectives are being treated by only two of the three courses (see section C, objectives of the course). Variability in techniques and resources utilized is also evident. One course involves lectures only; another is presented utilizing lecture, tutorial, audiovisual materials and resource personnel. However, final mark allocation is curiously consistent from one course to another, considering the differences in approach and emphasis in objectives.

There are at least three factors which appear to be producing variability in history courses: the background of the instructor; variation in the competencies of incoming students; and decreasing enrolments.

Since 85 percent of the instructors surveyed possess a doctorate, one may assume that at least this group has one specific area of special expertise. If an instructor has almost total autonomy in presenting a course, it is also logical to assume that an area or theme which has been investigated in depth by that instructor will be given some emphasis in the presentation of a course. Particularly when a course is broad in spatial or temporal scope (as in a survey course), development of a theme or area in some depth can add meaning

to the presentation. Thus for example, one might expect that different lecturers place different emphases in courses dealing with modern European history, calling upon their own areas of expertise.

The variation in competencies of incoming students as perceived by instructors has already been discussed at some length in this report. This great variability may lead instructors to adopt many approaches. They may attempt to accommodate those students with minimal competence and knowledge in history by teaching a very basic course, interpolating some richer materials for those students with some competence and background in history. They may give individual attention to the weaker students, while presenting a course which is primarily for the better history students. They may assume all students have minimal competence and present the course in a fashion appropriate to this level of competence. Judging by their rating of students' levels of competence, one might suspect that the latter approach predominates.

Another factor promoting the great variety of courses offered is the decrease in proportional enrolments in history taking place at most universities. Students have always entered university with varying interests and motivations; one of the ways to attract larger numbers at a time of declining enrolments is to offer many different types of courses (see Table 5.9).

The Secondary School Year 5/University Year 1 Interface

The relationship between history courses at secondary school year 5 and university year 1 must be discussed in terms of skill development, for while the acquisition of a certain body of general knowledge in history is desirable, the subject is not one whose content is sequential in presentation; moreover, we are dealing with only two years in isolation, and the content of the courses becomes secondary to the development of skills. As one can see in the course descriptions, instructors at both levels appear to agree on the skills they are attempting to develop - both general communication skills and skills specific to the analysis and interpretation of history. It is difficult to determine if secondary school and university instructors are starting at the same point in the development of these skills with their students. If one accepts at face value the level of competence that university instructors perceive incoming students to possess (see objectives section of course description) students generally are entering year 1 university history/ histoire with a very low level of competence. By the end of the year 1 university course, they have developed to the same level of competence as year 5 secondary school teachers indicate their group generally reaches. One may interpret the competence ratings given by respondents in different ways, as representing either variability in students or variation in the use of the rating scale among instructors at different levels, or both. Students perhaps are not grasping or remembering what is presented to them in previous history courses and must relearn. Students who have not taken history since secondary school year 1 or 2 are entering both year 5 secondary school history and year 1 university in enough numbers to alter the average competence level as perceived by the instructor. The instructor then assumes he must begin his instruction at a very basic level. One university histoire instructor indicated that this is what he did. Alternatively, instructors at university and secondary school are interpreting ratings such as "minimal"

or "moderate" competence differently. This possible difference of perception points to another problem. If history/histoire instructors are agreed concerning what is to be taught, it would seem advantageous that they also agree upon what should be taught where. For instance, if the majority of instructors are attempting to develop students' ability to assess events in terms of their historical context, it would seem appropriate for this development to take place on a continuum.

University history/histoire courses have no prerequisites; it is therefore likely that a good portion of each class includes students lacking a history background. University instructors' responses indicating that the variability in students' background (82 percent perceived a great deal while 18 percent perceived a moderate amount) results in great variability in knowledge and skill development support this interpretation. In addition, the majority of both history and histoire instructors were teaching at a university before the introduction of the credit system, at a time when, even though they may have found students in their classes who had not taken grade 13 history, a more rigid program structure at secondary school guaranteed some background in history because of history courses taken from grades 9 - 12. They can no longer assume this. The freedom of the credit system permits students to choose not to take history. On the other hand, university history courses must be extremely attractive to be able to interest students in taking history who up to that point have decided to sidestep the subject. It is more likely that students enrolling in university history have taken some secondary school history; however, the background of history courses taken need not be common. The majority of secondary school teachers and university instructors would prefer to have incoming students more competent in most of the areas to which they were asked to assign a competence rating (See Table 5.16). Given the variability of the student group and the fact that the instructor was to reply in terms of average competence, these preference ratings are to be expected. However, instructors at both levels consistently commented that their good students were as good as

TABLE 5.16

SECONDARY SCHOOL YEAR 5-UNIVERSITY YEAR 1 HISTORY/HISTOIRE INTERFACE
PERCENTAGE OF INSTRUCTORS PREFERRING A HIGHER LEVEL OF
STUDENT COMPETENCE AT ENTRY

	University	Secondary School	
	History	History	Histoire
A. Research			
1. Use libraries effectively (card cataloques, reference materials, encyclopedias, etc)	45%	78%	92%
2. Locate historical references (archives, government records, etc.)	40	68	78
3. Make effective use of historical references.	70	82	85
4. Distinguish between primary and secondary sources.	75	68	85
B. Writing			
1. Demonstrate facility in planning and organizing written materials	80	82	85
2. Use clear, concise prose necessary for the written presentation of concepts (essays, reports).	90	88	100
3. Use effective note-taking techniques	60	72	78

TABLE 5.16 (Cont'd)

SECONDARY SCHOOL YEAR 5-UNIVERSITY YEAR 1 HISTORY/HISTOIRE INTERFACE
PERCENTAGE OF INSTRUCTORS PREFERRING A HIGHER LEVEL OF
STUDENT COMPETENCE AT ENTRY

	University	Secondary School	
	History	History	Histoire
4. Apply historical terminology appropriately (e.g., Renaissance)	75%	78%	100%
5. Use appropriate conventions related to acknowledging references (e.g., footnotes, bibliography)	65	82	92
C. Oral			
1. Explain concepts clearly	75	90	92
2. Present an extended argument effectively	80	88	100
3. Present a prepared report	50	76	92
4. Contribute effectively in a small group discussion	60	70	71
D. Analytic and Interpretive			
1. Comprehend a variety of historical sources:			
1.1 documents	60	84	78
1.2 monographs	70	72	64
1.3 texts	60	64	92

TABLE 5.16 Cont'd)

SECONDARY SCHOOL YEAR 5-UNIVERSITY YEAR 1 HISTORY/HISTOIRE INTERFACE
PERCENTAGE OF INSTRUCTORS PREFERRING A HIGHER LEVEL OF
STUDENT COMPETENCE AT ENTRY

	University	Secondary School	
	History	History	Histoire
2. Analyze material read in terms of:			
2.1 identification of main thesis or argument	95%	76%	100%
2.2 identification of significant/pertinent information	85	76	92
3. Present an argument effectively in terms of organization, substance, (supportive factual material) logical conclusions	95	84	100
4. Distinguish between essential and non-essential information	85	90	100
5. Distinguish between fact and interpretation	85	80	92
6. Demonstrate understanding of basic historical concepts	80	82	100
7. Compare and contrast various interpretations of historical events	85	88	92
8. Identify bias	80	70	85
9. Assess an argument in terms of available evidence	75	74	92

TABLE 5.16 (Cont'd)

SECONDARY SCHOOL YEAR 5-UNIVERSITY YEAR 1 HISTORY/HISTOIRE INTERFACE
PERCENTAGE OF INSTRUCTORS PREFERRING A HIGHER LEVEL OF
STUDENT COMPETENCE AT ENTRY

	University	Secondary School	
	History	History	Histoire
10. Define a historical problem by means of an assessment of appropriate information	70%	88%	100%
11. Assess events in terms of their historical context	75	88	100
12. Analyze the characteristics of a particular period, problem or theme in history	75	82	92
13. Use historical concepts and information in order to understand contemporary issues.	55	80	100

or even better than ever. Evidence is lacking as to how many of those students who prove to be extremely competent in history have taken the complete continuum of history courses from year 1 to year 5 secondary school.

The relationship between these two courses may also be examined in terms of the instructional approach. Although audiovisual media are used in more courses at the secondary schools, other resource materials (for instance, texts, reference books, documents) seem to be used extensively at both secondary and university. Magazines, information kits, newspapers, etc., appear to be used more by secondary school history and by histoire instructors at both levels than by university history instructors. Mimeographed materials are used extensively by secondary school and university histoire instructors. The Socratic method is used over one-third of the time by approximately half of the secondary school history teachers; the lecture is used only minimally in the majority of courses (not more than 10 percent of the time). Lectures supplemented by the seminar/tutorial are normally utilized in university. In approximately two-thirds of the secondary school courses, student presentations form a small part. Although student presentations per se are utilized only infrequently in university, they form an integral part of the seminar/tutorial which is utilized in most university history courses. In addition, all university courses studied allocate more than 20 percent of the final mark to individual papers; the majority give them over 30 percent. When one examines the weight which is given to individual papers by secondary school teachers, one finds that 74 percent of the courses devote over 20 percent of the final mark to students' presentations; only 39 percent allocate more than 30 percent of the final mark to student papers. Thus, although there is some difference in the weight given to student papers, both levels appear to be giving some attention to this type of work. It is in the area of examinations that a large discrepency exists; 79 percent of the secondary school courses studied have no final examination taken by the majority of their year 5 history students; only 14 percent of the university courses permit students to forego the final examination. This discrepancy

has at least two implications for the interface. If university instructors are concerned, as some indicated, that students lack an historical perspective it may be due to the fact that students were not persuaded, by an impending examination, to cover a broad area of history. Particularly when courses at the secondary level tend to be organized by a series of themes or problems, a broad perspective may be lost. Two: students may be inexperienced in the art of studying for and writing an examination. Regardless of the merits of examinations, this discrepancy must be taken into account in assessing students who are unaccustomed to examinations.

The histoire interface is complicated by two additional variables. Few histoire year 5 courses contain a prerequisite; the potential for variability in students' histoire backgrounds is therefore increased. University instructors may be finding that their classes contain a considerable proportion of graduates of the Quebec educational system. It appears that these students possess a different background in histoire from that provided by Ontario secondary schools. Thus, one university studied appears to be offering what is essentially the year 5 histoire secondary school course; it has not, however, been determined whether this course is filled by Quebec students or by Ontario students who have not taken year 5 histoire at the secondary level.

Whether one examines the history or the histoire interface, it is clear that the relationship between courses at the secondary and university would benefit greatly by coordination.

6 Physics and Physique

SECONDARY SCHOOL PHYSICS/PHYSIQUE
YEARS 3 AND 5

COLLEGE PHYSICS YEAR 1

UNIVERSITY YEAR 1

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SECONDARY SCHOOL PHYSICS/PHYSIQUE YEARS 3 AND 5

A. The Sample

1. THE POPULATION OF COURSES

At the 53 English- and 14 French-language secondary schools that composed the sample for this study, three basic types of physics* courses were offered: year 5, year 3 advanced and year 3 general. A few of the schools offered other year 3 or 4 physics courses as described below. All but two of the schools in the sample offered at least one year 5 and one year 3 advanced course; one school offered courses only up to year 4 and another offered only a year 5 course. Forty-two of the English- and 12 of the French-language schools offered one or more year 3 general courses; 7 English- and 2 French-language schools offered no year 3 general physics, but 4 of the remaining English-language schools did offer one of the other courses described below.

The English-language schools sampled offered 13 of the 'other' year 3 or 4 physics courses, the French schools, 2. These 'other' courses can be classified as follows:

Industrial Physics	6
Space and Man	2
Aviation	1
Man, Science and Technology	1
General Science	1
Astronomy	1

The courses offered are summarized in Table 6.1.

*Throughout this report we have consistently used "physics" when referring to the subject (in English and French) in general. Whenever specific courses are mentioned a capital "P" is used, e.g., year 3 Physics; year 5 Physique.

TABLE 6.1

SECONDARY SCHOOL PHYSICS/PHYSIQUE
COURSES IN THE SAMPLE

	Physics		Physique	
	Courses offered	Courses selected	Courses offered	Courses selected
Year 3 general	45	36	12	11
Year 3 advanced	53	50	17	12
Year 3 other[a]	13	3[b]	2	0
Total	111	89	31	23
Year 5	52	50[c]	14	12

[a] For a description of this category see accompanying text.

[b] These were included in the year 3 general course for analysis.

[c] There were actually 49 courses sampled, but 1 was taught by 2 different teachers.

Historical Events Affecting Curriculum and Organization of Subjects

Twenty selected physics department heads in the secondary schools sampled in this study were interviewed in order to obtain information about the development and background of physics teaching in secondary schools over the last decade. The major changes in the teaching of physics over this period of time involved the addition of the year 3 general course in the late 60s and the advent of new courses, Space and Man, and Man, Science and Technology, which were introduced in 1969 and 1972 respectively in order to parallel those courses which had been developed in the social sciences in secondary schools in the late 1960s for general level students. The popularity of the more applied, pragmatic approach in these social science courses was a major motivation for introducing these new physics courses.

The most recent Ontario Ministry of Education guidelines for physics courses in secondary schools were introduced for year 3 in 1966 and for year 5 in 1967. The introduction of the year 3 Ministry guideline preceded the division of the old year 3 physics course into advanced and general courses. It appears that the Physical Science Study Committee course, which was developed in the United States in the late 1950s has been used fairly extensively as a curriculum guideline in the secondary schools, particularly in year 5 Physics courses. The P.S.S.C. provided not merely a conceptual framework for the study of contemporary physics, but a textbook, specially written reference books and films, and a series of objective tests, all of which the Ontario physics teacher was encouraged to use. In some instances, however, the schools indicated that this guideline had been tried out but discarded.

Secondary school physics evidently has been affected less by the recent competition for students than have other subject areas in the schools. The clientele for physics, particularly at the year 5 level, consists of students who have well-defined post-secondary educational goals and consequently need year 5 Physics to gain admission to appropriate university programs. According to the department heads

interviewed, these students are strongly motivated and have a very positive attitude to physics. There is, however, apparently still very high variability in the level of achievement at which these students enter and exit from year 5 Physics.

There also has been a trend toward more student-centered activities in the teaching of physics, in that the stress on student projects, individual assignments and laboratory experiments has increased. Trends in the evaluation of students are similar to those in other areas: there has been less weight placed recently on the final examination and more on laboratory notebooks, experiments and individual projects, etc. In a few instances, however, department heads noted that there has been a trend back to more formal and more heavily weighted final examinations.

2. *NATURE OF COURSES SAMPLED*

Year 5 and year 3 advanced courses for almost all of the secondary schools in the sample were selected for detailed analysis. In the case, therefore, of year 5 Physics and year 3 advanced Physics, and year 3 general Physique, the sample represents the vast majority of courses offered. For year 3 advanced Physique and year 3 general Physics, the course selection, although not so complete, still represents a substantial majority of the courses taught in the secondary school sample. The content of the three "other" year 3 courses selected was, according to the calendar descriptions, quite similar in nature to that of the year 3 general courses in schools which offered the general courses, and these three courses were included in the year 3 general category. (See Table 6.1)

B. Factors Influencing Teaching Of Courses

1. *BACKGROUND OF INSTRUCTORS*

On the average, instructors teaching year 3 general and year 3 advanced Physics courses had ten years of teaching experience.

Year 5 Physics teachers had almost two years' more experience. Those teaching all three levels of physique courses averaged six years of teaching experience, a result one might expect in view of the comparatively recent introduction of physique into Ontario high schools. On the whole, a similar pattern persisted in the number of years teachers had taught the course they were presently teaching, although, naturally enough, a briefer period of time was involved. Year 3 general Physics teachers had on the average taught the course for 5.5 years, while their counterparts in year 3 advanced and year 5 Physics courses generally had 1.5 and 2 years' more experience respectively. Teachers of physique at each of the three levels had taught their present courses for fewer years and the average number of years of teaching experience was generally 2.5 years less than for the equivalent physics teachers. A high percentage of teachers sampled were either department heads or assistant department heads, expecially in year 5 Physique.

A higher percentage of physique teachers held master's degrees - 31 percent; 16 percent of physics instructors had this degree. Fewer teachers of year 3 general Physics had graduate degrees; they also tended to be slightly less qualified according to provincial certification standards than were year 3 advanced and year 5 Physics teachers.

The vast majority of teachers sampled were teaching courses closely related to their training: 65 percent of the physics teachers taught in their area of specialization, 27 percent taught in closely related areas. For physique, 91 percent of the teachers taught in their area of specialization.

A substantial majority of the physics teachers had no teaching experience at other institutional levels. The physique teachers tended to have more experience elsewhere, but a majority still had not.

The qualifications and experience of the physics teachers sampled appear to be good. As expected, the year 3 general teacher tends to have less experience and to be slightly less qualified. Although physique teachers tend to have less experience, they appear to be highly qualified academically, and their area of specialization is more often directly in physics.

Figure 10

BACKGROUND OF TEACHERS

SECONDARY SCHOOL PHYSICS
PERCENTAGE OF TEACHERS IN EACH CATEGORY

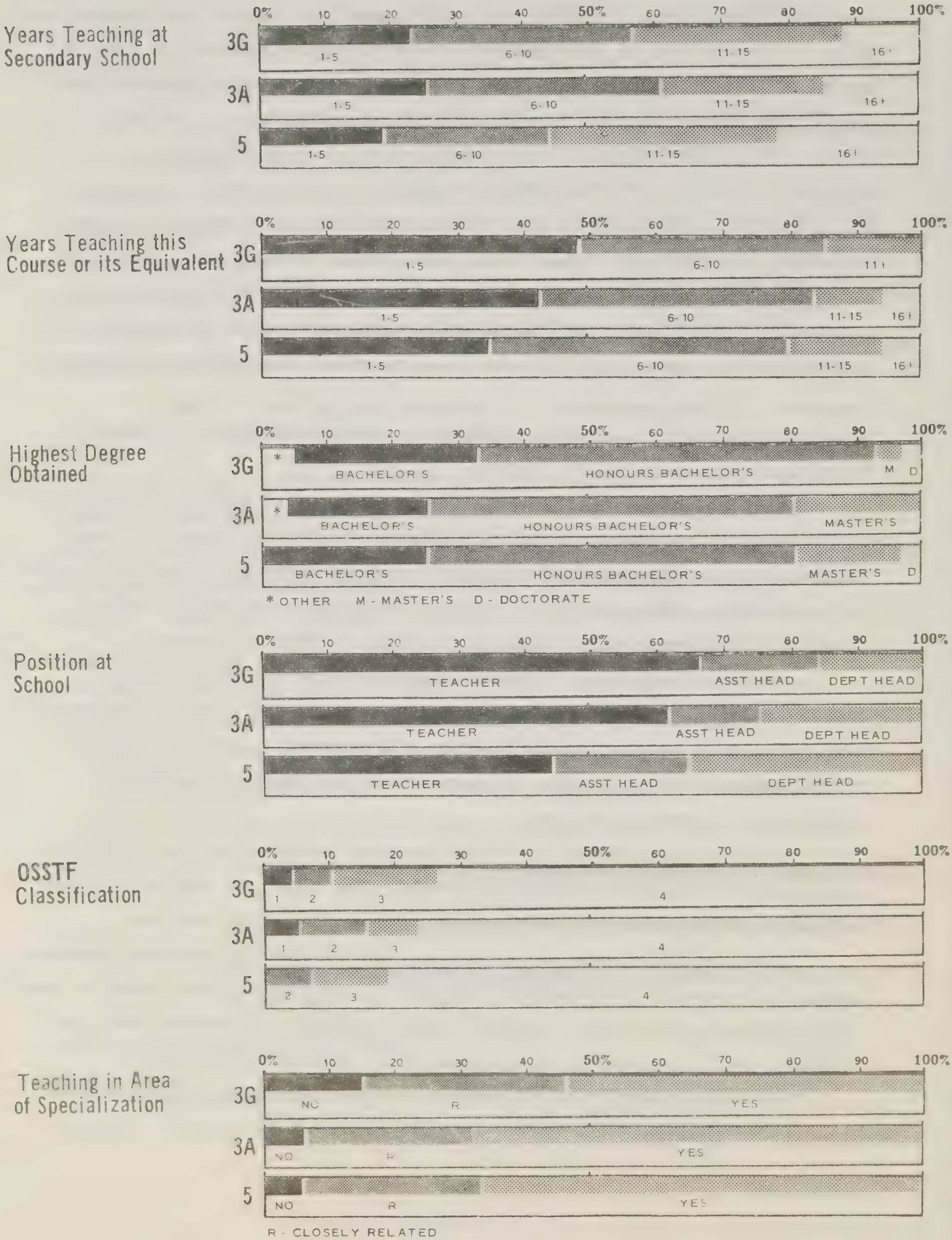
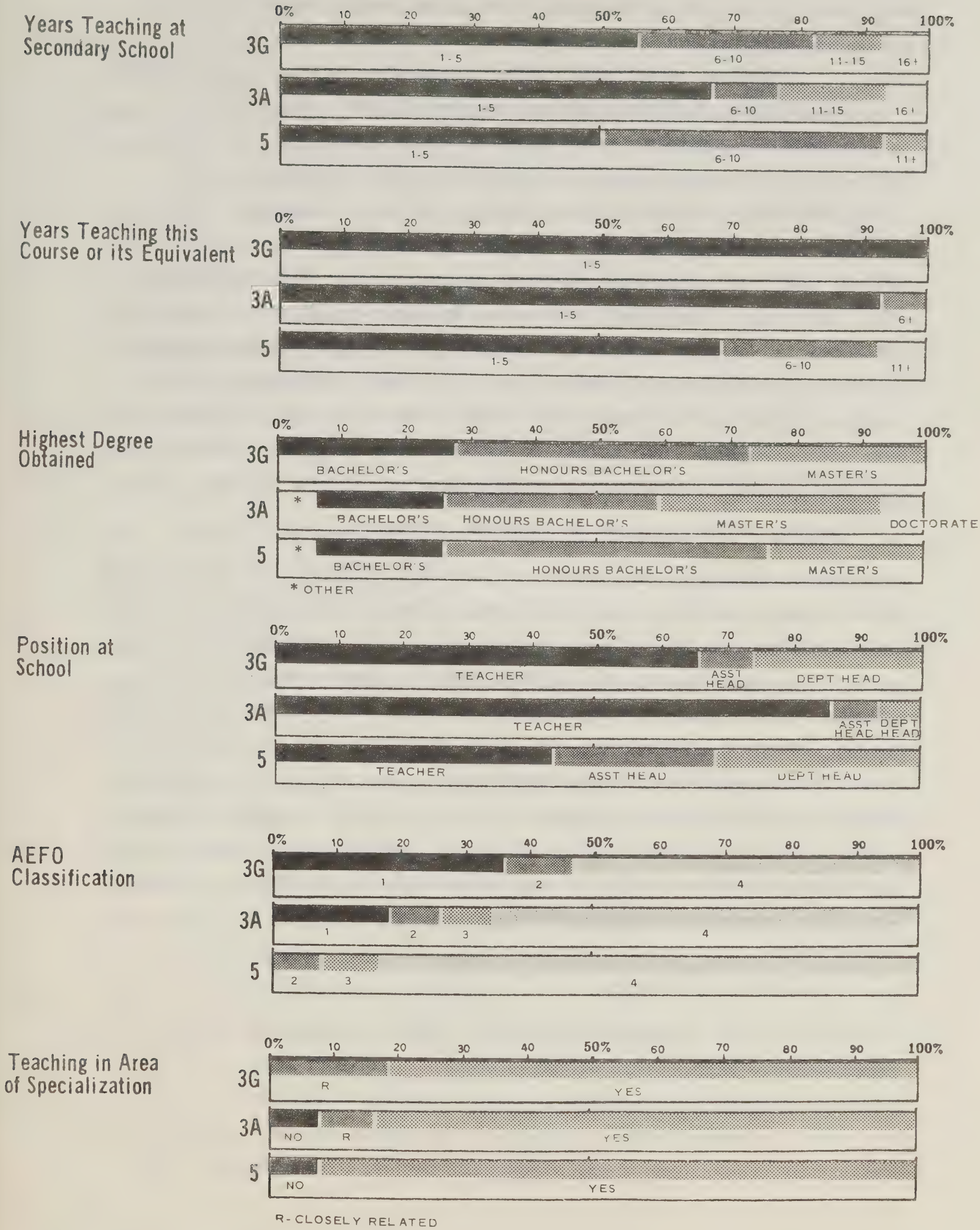


Figure 11

BACKGROUND OF TEACHERS

SECONDARY SCHOOL PHYSIQUE
PERCENTAGE OF TEACHERS IN EACH CATEGORY



2. *PREREQUISITES AND COREQUISITES FOR COURSES SAMPLED*

There was a high level of consistency in the nature of prerequisites across the physics courses sampled. In the case of year 3 general courses, 58 percent of schools either required or strongly recommended a previous physical science course in years 1 or 2. Many also recommended a concurrent year 3 mathematics course. For the other two courses, prerequisites were almost universally demanded: 82 percent of year 3 advanced and 94 percent of year 5 Physics courses had some formal prerequisite. For year 3 advanced courses, almost all schools required a previous physical science course and recommended a concurrent year 3 mathematics course. In the case of year 5 courses, virtually all schools explicitly required the year 3 advanced course, and many also recommended one or more concurrent mathematics courses (usually Relations and Functions and/or Calculus). Most of the other year 3 or 4 physics courses had no explicit prerequisite. Those which did most commonly required a previous physical science course.

3. *QUALITY OF PREPARATION OF INCOMING STUDENTS*

Information regarding the quality of incoming students was derived from two different sources. On the one hand, the physics teachers sampled were asked to rate very generally the quality of these students, on a scale of poor to excellent, and the degree to which they varied in competency. On the other hand, teachers were asked to assess both the actual and the preferred level of student achievement on entry to their courses for a very detailed list of physics content topics, grouped under 21 major headings (discussed in Section C of the physics report, below). The difference between teachers' assessments of the actual and the preferred entry levels of competence gives some measure of their satisfaction with the quality of their students.

(a) Preparation in General

Teachers of year 3 advanced and year 5 Physics courses in general expressed comparatively high levels of satisfaction. Although only 3 of all teachers queried were willing to rate students "excellent," 62 percent of the year 3 advanced and 67 percent of the year 5 teachers considered the quality of preparation good; almost all the rest considered it fair.

For year 3 general, the figures were, however, reversed: only 21 percent of physics teachers considered incoming students good; 69 percent rated them only fair and 10 percent thought them poorly prepared.

The physique teachers generally were less satisfied with the quality of their incoming students; 58 percent of year 3 advanced and 50 percent of year 5 teachers rated them as poor or fair. Again, year 3 general Physique teachers were most unhappy with the preparation of incoming students; 45 percent rated them as poor.

On the question of variability, teachers of the six courses were much nearer agreement; over 90 percent of teachers in all courses but year 3 general Physique rated variation as great or moderate. For year 3 general Physique, the percentage was 80. This high variation in the preparation of incoming students certainly complicates the instruction of students in secondary school physics.

The information derived from assessments of levels of satisfaction can be used to flesh out the general impressions reported above. It must, however, be regarded as referring to a rather mythical "average" student, in view of the high variability that most teachers reported.

(b) Physics Preparation

When teachers' assessments for each of the 21 major content heading topics were examined, there emerged a high level of satisfaction with student achievement on entry to the six secondary school physics courses sampled. In year 3 advanced Physics there was only one topic, Measurement, in which a substantial minority of teachers consistently indicated (across all subtopics) a desire for a higher level of student achievement on entry. In the next three major topics, Functions, Motion, and Newton's Laws - Particles, there were isolated instances of subtopics where a substantial minority expressed dissatisfaction. In all other instances within these three topics and for all other topics, teachers expressed a very high level of satisfaction with achievement at entry. As one would expect, year 3 general Physics teachers were rather more dissatisfied with levels of entry.

In six of the ten subtopics in Work, Energy and Power, 25 percent of the respondents expressed displeasure and a slightly smaller number, 20 percent, were dissatisfied with certain aspects of student preparation in Electricity and Magnetism.

The pattern for year 3 advanced and general Physique courses was very similar to that for the parallel English courses, although teachers of these courses, particularly those teaching the advanced course, tended to be slightly more dissatisfied. This was evident in three topics--Functions, Motion, and Newton's Laws - Dynamics of a Particle--and for teachers of year 3 general Physique, in the topic Gravity - Near the Earth's Surface. In the case of Work, Energy, and Power, and Electricity and Magnetism, it was the advanced physique course teachers rather than the general level teachers who expressed slightly greater levels of dissatisfaction.

Year 5 Physique teachers were markedly less happy than their physics counterparts with entry levels in those subtopics that were taught by a high percentage of the instructors sampled. This dissatisfaction, however, on average still only represented a substantial minority of respondents. The level of satisfaction with student entry achievement on the part of year 5 Physics teachers was surprisingly high, even more so than was the case in year 3 advanced Physics. The level of dissatisfaction with subtopics widely taught seldom exceeded 30 percent of the teachers sampled; on average, it ranged between 10 and 20 percent. In the case of subtopics which were not widely taught, the dissatisfaction level dropped even lower. In this latter instance, it also was the case in year 5 Physique.

(c) Mathematical Skills

Because the possession of certain mathematical skills represents an important part of the learning of physics, teachers in the secondary school physics courses sampled were asked to indicate the degree to which students were expected to have mastered fourteen selected mathematical skills, and whether or not students in fact did possess the desired level of competence. Tables 6.2 and 6.3 illustrate these data for the six secondary school physics courses.

TABLE 6.2

SECONDARY SCHOOL PHYSICS
MATHEMATICAL SKILLS

Skill	Year 3G[a]			Year 3A[b]			Year 5		
	Skill not expected	Skill expected		Skill not expected	Skill expected		Skill not expected	Skill expected	
		Not ach'd[d]	Ach'd		Not ach'd	Ach'd		Not ach'd	Ach'd
Ability to use concepts of ratio and proportion	15%[c]	73%	12%	8%	60%	32%	6%	44%	50%
Use of logarithms	86	12	2	92	8	0	58	30	12
Use of exponential functions	81	17	2	76	20	4	64	24	12
Ability to convert degrees to radians	93	5	2	92	6	2	66	20	14
Use of trigonometric functions	63	25	12	46	46	8	6	26	68
Use of trigonometric identities	93	7	0	88	10	2	60	28	12
Manipulations of linear equations	15	61	24	10	44	46	4	22	74
Ability to solve simultaneous linear equations	61	37	2	40	46	14	6	36	58
Ability to find the roots of a quadratic equation	93	7	0	72	24	4	14	36	50
Ability to differentiate simple functions	90	10	0	94	6	0	82	12	6
Ability to integrate simple functions	95	5	0	98	2	0	90	6	4
Ability to manipulate vectors	80	20	0	56	34	10	28	44	28
Facility with vector algebra	98	2	0	80	16	4	60	28	12
Ability to apply the binomial expansion	100	0	0	100	0	0	96	4	0

[a] 3G=year 3 general [b] 3A=year 3 advanced [c] % of teachers [d] Ach'd=achieved

TABLE 6.3

SECONDARY SCHOOL PHYSIQUE
MATHEMATICAL SKILLS

Skill	Year 3G[a]			Year 3A[b]			Year 5		
	Skill not expected	Skill expected		Skill not expected	Skill expected		Skill not expected	Skill expected	
		Not ach'd[d]	Ach'd		Not ach'd	Ach'd		Not ach'd	Ach'd
Ability to use concepts of ratio and proportion	0%[c]	89%	11%	9%	36%	55%	0%	50%	50%
Use of logarithms	100	0	0	82	18	0	25	67	8
Use of exponential functions	100	0	0	82	18	0	50	42	8
Ability to convert degrees to radians	100	0	0	91	9	0	55	27	18
Use of trigonometric functions	67	33	0	45	55	0	0	42	58
Use of trigonometric identities	89	11	0	64	36	0	33	50	17
Manipulation of linear equations	11	56	33	0	73	27	0	17	83
Ability to solve simultaneous linear equations	44	44	12	70	20	10	0	67	33
Ability to find the roots of a quadratic equation	78	11	11	55	27	18	0	45	55
Ability to differentiate simple functions	89	11	0	90	10	0	25	50	25
Ability to integrate simple functions	100	0	0	100	0	0	45	45	10
Ability to manipulate vectors	78	22	0	36	46	18	0	82	18
Facility with vector algebra	89	11	0	64	36	0	27	64	9
Ability to apply the binomial expansion	100	0	0	100	0	0	91	9	0

[a] 3G=year 3 general [b] 3A=year 3 advanced [c] % of teachers [d] Ach'd=achieved

In the year 3 general Physics and Physique courses, there were only two mathematical skills which more than 50 percent of the teachers expected students to have mastered. One hundred percent of the physique and 85 percent of physics teachers expected incoming students to be able to use concepts of ratio and proportion; more than three-quarters found they could not. In two other areas - use of trigonometric functions and ability to solve simultaneous linear equations - a substantial number expected competence. Few of the physique teachers and fewer than half of the physics teachers found it.

In year 3 advanced Physics courses, the mathematical skills expected of incoming students were somewhat greater, and as might be expected, the students were more often likely to possess those skills although, as Tables 6.2 and 6.3 demonstrate, the emphases and expectations differ between the physics and physique courses. These trends were true in the two skills most widely expected in year 3 general Physics courses, ability to use concepts of ratio and proportion and manipulation of linear equations. Use of trigonometric functions and ability to solve simultaneous linear equations were skills more often expected by year 3 advanced Physics teachers, but very seldom realized by incoming students. Two additional mathematical skills, ability to find the roots of a quadratic equation and to manipulate vectors, were expected by a substantial minority of year 3 advanced Physics course teachers, but were realized by only a small percentage of incoming students.

One might predict that year 5 Physics teachers had higher expectations, and indeed they did, especially the year 5 Physique teachers. In only three of the listed skills did the vast majority of year 5 Physics teachers not expect any competency by incoming students. These were the ability to differentiate and to integrate simple functions, and the ability to apply binomial expansion. The physique teachers had much greater expectations in the first of these three skills. There was no evidence to suggest, however, that these expectations were met less often by incoming physique students than was the case in year 5 Physics. A majority of year 5 Physics teachers did not expect competency in the use of exponential functions, the ability to convert degrees to radians, and facility with vector algebra.

In all the other mathematical skills listed in Tables 6.2 and 6.3, the majority of year 5 teachers expected competency on the part of incoming students, but found it with widely varying success. A majority of the incoming year 5 Physics students were found to possess four of these skills--the ability to use concepts of ratio and proportion, the use of trigonometric functions, the manipulation of linear equations, and the ability to find the roots of a quadratic equation. In the case of the seven other expected mathematical skills, the number of incoming students who did exhibit mastery ranged from a very small percentage to a substantial minority.

4. *OTHER FACTORS INFLUENCING THE TEACHING OF THE COURSE*

Table 6.4 indicates the extent to which nine selected factors influenced the teaching of physics in the secondary schools sampled. All teachers, especially those in physique, indicated that the interests of the students was one of the most important factors in the teaching of these courses. The vast majority of responses to this factor for each of the six courses sampled were in two categories: to a moderate, and to a great extent.

In all courses, a substantial majority of teachers indicated that the Ontario Ministry of Education guidelines influenced their teaching to a moderate or to a great extent. Teachers in the three physics courses tended to give almost as much weight to the course outline assigned to them as they did to the Ministry guideline, but physique teachers rated any course outline assigned to them as relatively unimportant. Fifty percent of the year 5 Physique teachers indicated that incoming students' knowledge of the subject and information regarding the future plans of the students influenced their teaching to a great extent, a considerably higher rating than was given to those items by the instructors of the other five courses. The physique teachers in general consistently rated their own special interests and background as a very influential factor in their teaching of the course. Perhaps this is a reflection of their high level of qualification and the very high percentage who are teaching in their area of specialization.

TABLE 6.4

SECONDARY SCHOOL PHYSICS/PHYSIQUE
FACTORS INFLUENCING THE TEACHING OF THE COURSE

Factor	Physics						Physique					
	Year 3G		Year 3A		Year 5		Year 3G		Year 3A		Year 5	
	WM[a]	R[b]	WM	R	WM	R	WM	R	WM	R	WM	R
Interests of students	2.2	1	2.0	3	1.8	4	2.5	2	0.3	1	2.4	2
Students' knowledge	1.7	4	1.7	5	2.0	3	1.5	4	1.9	4	2.3	3
Relationship to concurrent courses	1.7	4	1.5	7	1.5	8	1.4	6	1.4	7	1.7	7
Information on students' future plans	1.5	7	1.7	5	1.7	5	1.3	7	1.5	6	2.3	3
Ontario Ministry of Education guidelines	1.6	6	2.1	1	2.3	1	1.8	3	2.2	3	2.0	5
Assigned course outline	2.0	2	2.1	1	1.7	5	1.1	8	0.3	8	0.5	8
Teachers' special interests and training	1.9	3	1.8	4	1.7	5	2.7	1	2.3	1	2.6	1
Principal text(s)	1.4	8	1.6	8	2.2	2	1.5	4	1.8	5	1.8	6
Staffing	1.0	9	0.6	9	0.6	9	0.6	9	0.4	9	0.0	9

[a]WM=weighted mean. Each category was assigned a weighting: 0-not at all; 1-to a small extent; 2-to a moderate extent; 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b]R=rank. Factors were ranked on the basis of weighted means.

C. Characteristics of the Course

1. GENERAL AIMS

Tables 6.5 and 6.6 indicate the relative emphasis given to various stated general aims of physics courses, expressed for each of the six physics courses sampled in the secondary schools. As could be expected in this type of question, respondents tended to subscribe liberally to all of the aims listed in the questionnaire. The following points appear worth noting. First, there was a particularly high emphasis over all six courses given to developing in the student the capacity to think rationally, and in particular, to organize data and arrive at a solution. Second, there was a consistent and markedly strong emphasis in all three of the physique courses on understanding the scientific method and on applying it according to four of the five subheadings as follows: collecting data, organizing and analyzing the data, interpreting the results, and communicating the results. The ability to set up an experiment generally received less emphasis. This was particularly true in physics courses, where typical responses fell between "to a small" and "to a moderate extent". Third, the physics teachers in all six courses gave less emphasis to the two more general aims on the list (recognize activities as applications of the principles of physics, and awareness of historical development). The typical emphasis placed on the first of these aims was moderate and for the second it vacillated between "to a moderate" and "to a small extent".

2. THE OBJECTIVES OF THE COURSE

(a) Course Content

Section IV of the questionnaire was designed to provide an overview of the content of the six secondary school courses sampled. A total of 165 specific topics were organized under 21 major topics. For each of the 6 physics courses a categorization of major headings was made on the basis of the consistency with which topics under the major headings were taught across all courses. For year 3 advanced and year 5 courses, an additional influence upon the categorization of a topic was its presence or absence in the relevant Ministry of Education guideline. A major topic in a given course

TABLE 6.5

SECONDARY SCHOOL PHYSICS
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	Year 3G		Year 3A		Year 5	
	WM[a]	R[b]	WM	R	WM	R
1. The student should acquire an attitude of scientific curiosity	2.1	5	2.3	5	2.4	5
2. The student should be able to think rationally and						
a. organize data presented in a problem and arrive at a solution	2.5	1	2.9	1	3.0	1
b. evaluate in empirical terms reports of observed phenomena	1.9	8	2.2	7	2.2	7
3. The student should understand the scientific method	2.0	6	2.1	8	2.2	7
4. The student should be able to apply the scientific method to the study of behavior of matter and demonstrate ability						
a. to design and set up an experiment	1.7	10	1.7	10	1.5	11
b. to collect experimental data	2.3	2	2.3	5	2.4	5
c. to organize and analyze experimental data	2.2	3	2.4	3	2.6	2
d. to interpret the results of experiments	1.9	8	2.4	3	2.6	2
e. to communicate the results of experiments	2.2	3	2.5	2	2.5	4
5. The student should understand technological and engineering activities as applications of the principles of physics	2.0	6	2.1	8	1.8	9
6. The student should be aware of the historical development of ideas and concepts in physics	1.4	11	1.7	10	1.8	9

[a]WM=weighted mean. Each category was assigned a weighting: 0-not at all; 1-to a small extent; 2 to a moderate extent; 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled, and a mean derived by dividing by the number of respondents.

[b]R=rank. Factors were ranked on the basis of weighted means.

TABLE 6.6.

SECONDARY SCHOOL PHYSIQUE
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	Year 3G WM[a]	Year 3G R[b]	Year 3A WM	Year 3A R	Year 5 WM	Year 5 R
1. The student should acquire an attitude of scientific curiosity	2.7	3	2.7	5	2.3	7
2. The student should be able to think rationally and						
a. organize data presented in a problem and arrive at a solution	2.6	6	2.8	2	2.9	1
b. evaluate in empirical terms reports of observed phenomena	2.5	7	2.8	2	2.3	7
3. The student should understand the scientific method	2.2	8	2.9	1	2.7	6
4. The student should be able to apply the scientific method to the study of the behavior of matter and demonstrate ability						
a. to design and set up an experiment	2.7	3	2.2	9	1.9	9
b. to collect experimental data	2.9	1	2.6	6	2.8	4
c. to organize and analyze experimental data	2.7	3	2.6	6	2.9	1
d. to interpret the results of experiments	2.1	10	2.6	6	2.8	4
e. to communicate the results of experiments	2.9	1	2.8	2	2.9	1
5. The student should understand technological and engineering activities as applications of the principles of physics	2.2	8	2.1	10	1.8	11
6. The student should be aware of the historical development of ideas and concepts in physics	1.0	11	1.9	11	1.9	9

[a] WM=weighted mean. Each category was assigned a weighting: 0-not at all; 1-to a small extent; 2-to a moderate extent; 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b] R=rank. Factors were ranked on the basis of weighted means.

was considered to have a high degree of consistency if (a) all subtopics were taught by 81-100 percent of the teachers; (b) all subtopics were taught by 0-20 percent of the teachers; or (c) some subtopics were taught by 81-100 percent and the remainder were taught by 0-20 percent of the teachers. However, one or more of the subtopics under a major heading may have been covered as an optional or enrichment topic in many courses thus producing values in the 21-40 percent, 31-60 percent and 61-80 percent ranges. It was decided, therefore, that if all of the subtopics listed in the appropriate Ministry of Education courses guidelines were taught by 81-100 percent of the teachers for that major heading, such a topic would still be designated as having a high degree of consistency. A major heading was considered to have a low degree of consistency if many of its subtopics (including several from the Ministry guidelines, where applicable) were taught by 41-60 percent of the teachers. It was considered to have a moderate degree of consistency if its subtopics were scattered in terms of percentage of teachers teaching them. A major heading was sometimes listed in two categories if several of its subtopics had a high and other subtopics had a moderate degree of consistency of coverage.

Some problems in determining degrees of consistency were encountered. In order to validate our use of the curriculum guidelines, we attempted to determine whether any of the subtopics taught by 81-100 percent of the teachers in Table 6.7 were not in the guidelines, and whether all subtopics in the guidelines were taught by 81-100 percent of the teachers.

For the year 5 course, there were a number of subtopics taught by 81-100 percent of the teachers which were not in the curriculum guideline. All the subtopics in the curriculum guideline were taught by 81-100 percent of the teachers.

There is considerably more variation between the year 3 advanced courses as taught and as outlined in Curriculum S-17a. The topics which affect the entries under "High degree of consistency of coverage" are as follows:

Year 3 advanced Physics: Although 4 subtopics of Newton's Laws-Dynamics of a Particle are taught by 81-100 percent of the teachers, only 3 of these are in the guideline; one subtopic which is in the guideline is taught by 41-60 percent of the teachers. This subtopic, however, is a minor one, and the topic was left in the "high" column.

TABLE 6.7

SECONDARY SCHOOL PHYSICS YEAR 3 GENERAL
EXTENT TO WHICH MAJOR TOPICS TAUGHT

High Consistency		Moderate Consistency[a]	Low Consistency[b]
Covered by >81% of Teachers	Covered by <20% of Teachers		
Newton's Laws (Particles) (2 topics)	Newton's Laws (Particles) (3 topics)	Measurement	Nuclear Physics
Work, Energy, and Power (2)	Momentum	Functions	
	Work, Energy and Power (3)	Motion	
	Interference and Diffraction (12)	Newton's Laws (Particles)	
	Universal Gravitation (4)	Statics	
	Properties of Solids	Newton's Laws (Rigid Body)	
	Special Theory of Relativity	Gravity	
	Properties of Elementary Particles	Universal Gravitation	
		Work, Energy, and Power	
		Vibrations and Waves	
		Light	
		Interference and Diffraction	
		Electricity and Magnetism	
		Atomic Structure	
		Fluids at Rest	
		Temperature and Heat	

[a]Coverage Scattered

[b]Many subtopics covered by 41-60% of teachers

TABLE 6.8

SECONDARY SCHOOL PHYSIQUE YEAR 3 GENERAL
EXTENT TO WHICH MAJOR TOPICS TAUGHT

High Consistency		Moderate Consistency[a]	Low Consistency[b]
Covered by >81% of Teachers	Covered by <20% of Teachers		
Work, Energy and Power (2)	Momentum	Measurement	Temperature and Heat
Light (6)	Work, Energy and Power (2)	Functions	Statics
Electricity and Magnetism (8)	Interference and Diffraction (12)	Motion	
	Electricity and Magnetism (4)	Newton's Laws (Particles)	
	Special Theory of Relativity	Newton's Laws (Rigid Body)	
	Properties of Elementary Particles	Gravity	
		Universal Gravitation	
		Work, Energy, and Power	
		Vibrations and Waves	
		Light	
		Interference and Diffraction	
		Electricity and Magnetism	
		Atomic Structure	
		Fluids at Rest	
		Nuclear Physics	
		Properties of Solids	

[a] Coverage Scattered
[b] Many subtopics covered by 41-60% of teachers

TABLE 6.9

SECONDARY SCHOOL PHYSICS YEAR 3 ADVANCED
EXTENT TO WHICH MAJOR TOPICS TAUGHT

High Consistency		Moderate Consistency[a]	Low Consistency[b]
Covered by >81% of Teachers	Covered by <20% of Teachers		
Motion (2)	Special Theory	Measurement	Atom Structure
Newton's Laws (Particles) (4)	Properties of Elementary Particles	Functions	Nuclear Physics
Gravity (2)	Statics	Motion[c]	
Work, Energy, and Power (5)	Temperature and Heat	Newton's Laws (Particles)[c]	
Vibrations and Waves (3)	Motion (2)	Universal Gravitation	
	Newton's Laws (Particles) (2)	Momentum	
	Vibrations and Waves	Work, Energy and Power[a]	
		Vibrations and Waves[a]	
		Light	
		Interference and Diffraction	
		Electricity and Magnetism	
		Fluids at Rest	
		Properties of Solids	

[a] Coverage Scattered
[b] Many subtopics covered by 41-60% of teachers
[c] Many are covering extra topics in addition to basic material

TABLE 6.10

SECONDARY SCHOOL PHYSIQUE YEAR 3 ADVANCED
EXTENT TO WHICH MAJOR TOPICS TAUGHT

High Consistency		Moderate Consistency[a]	Low Consistency[b]
Covered by >81% of Teachers	Covered by <20% of Teachers		
Motion (1)	Motion (4)	Measurement	
Newton's Laws (Particles) (4)	Newton's Laws (Particles (2)	Functions	
Work, Energy, Power (6)	Universal Gravitation (4)	Motion[c]	
Vibrations and Waves (4)	Momentum	Newton's Laws (Particles)	
Light (13)	Vibrations and Waves (9)	Statics	
	Properties of Solids	Work, Energy and Power[a]	
	Special Theory of Relativity	Vibrations and Waves[a]	
	Properties of Elementary Particles	Light	
		Interference and Diffraction	
		Electricity and Magnetism	
		Fluids at Rest	
		Temperature and Heat	
		Nuclear Physics	
		Atomic Structure	

[a] Coverage Scattered
[b] Many subtopics covered by 41-60% of teachers
[c] Many are covering extra topics in addition to basic material

TABLE 6.11
SECONDARY SCHOOL PHYSICS YEAR 5
EXTENT TO WHICH MAJOR TOPICS TAUGHT

High Consistency		Moderate Consistency[a]	Low Consistency[b]
Covered by >81% of Teachers	Covered by <20% of Teachers		
Motion (5)	Motion (6)	Measurement	Electricity and Magnetism
Newton's Laws (Particles)	Statics	Functions	
Gravity (4)	Temperature and Heat	Newton's Laws (Rigid Body)	
Universal gravitation	Properties of Solids	Vibrations and Waves	
Momentum (5)	Fluids at Rest	Nuclear Physics	
Work, Energy, Power (7)	Properties of Elementary Particles	Interference and Diffraction[a]	
Interference and Diffraction (6)	Momentum (3)	Special Theory of Relativity	
Atomic Structure (8)		Light	

[a]Coverage Scattered

[b]Many subtopics covered by 41-60% of teachers

TABLE 6.12

SECONDARY SCHOOL PHYSIQUE YEAR 5
EXTENT TO WHICH MAJOR TOPICS TAUGHT

High Consistency		Moderate Consistency[a]	Low Consistency[b]
Covered by >81% of Teachers	Covered by ≤20% of Teachers		
Motion (5)	Temperature and Heat	Measurement	Light
Newton's Laws (Particles)	Properties of Solids	Functions	Electricity and Magnetism
Gravity (4)	Fluids at Rest	Statics[a]	Atomic structure
Universal Gravitation (4)	Properties of Elementary Particles	Newton's Laws (Rigid Body)	
Momentum (5)	Special Theory	Vibrations and Waves	
Work, Energy and Power (7)	Nuclear Physics	Interference and Diffraction	

[a] Coverage Scattered
[b] Many subtopics covered by 41-60% of teachers

Year 3 Advanced Physique. (1) Measurement: although 4 subtopics are taught by 81-100 percent of the teachers, 2 of these are not in the curriculum guideline and 1 subtopic which is in the guideline is taught by 61-80 percent of the teachers. Measurement, therefore, was placed in the "moderate" column. (2) Newton's Laws-Dynamics of a Particle: as in year 3 Physics, 4 subtopics are taught by 81-100 percent of the teachers, but one of these is not in the guideline and a subtopic which is in the guideline is taught by 41-60 percent of the teachers. Again this topic was left in the "high" column. (3) Gravity: although 2 subtopics are taught by 81-100 percent of the teachers, one of these is not in the guideline; a subtopic which is in the guideline is taught by 41-60 percent of the teachers. Gravity, therefore, was placed in the "moderate column". (4) Vibrations and Waves: although 4 subtopics are taught by 81-100 percent of the teachers, one of these is not in the guideline, but one subtopic which is in the guideline is taught by 41-60 percent of the teachers. Since this is a minor subtopic, Vibration and Waves was left in the "high" column.

The results of this analysis are presented in Tables 6.7 to 6.12. Both year 5 courses show a high degree of consistency of coverage for most of the major content headings. The only major exception for both courses is Topic 14, Electricity and Magnetism, which has a low degree of consistency. This is particularly evident among the physique teachers; 14 of the 32 subtopics were taught by 41-60 percent of the teachers. Fewer physics teachers taught most of these subtopics; only 20 percent taught 16 of the subtopics. It should be noted that the major topics Measurement and Functions exhibited only a moderate degree of consistency of coverage by both French and English teachers. Neither group covered all the subtopics presented in the Ministry curriculum guideline.

Year 5 Physique teachers appear to concentrate on subtopics contained in major headings 3-10 inclusive; these are not so heavily stressed in year 5 Physics. (These major headings comprise content which is generally described as mechanics; they can be seen in Table 6.13 and 6.14.)

For instance: (1) All subtopics of Newton's Law-Dynamics of a Particle were taught by more than 80 percent of the physique teachers; only 7 subtopics fell in this range for the physics teachers. (2) One subtopic in statics was taught by 41-60 percent of the physique teachers; none was taught by more than 20 percent of the physics teachers. (3) Two subtopics of Newton's Laws-Dynamics of a Rigid Body were taught by 41-60 percent of physique teachers but none was taught by more than 20 percent of physics teachers (this entire heading is not in the curriculum guideline). (4) Under Momentum, five subtopics fell in the 81-100 percent range and three in the 21-40 percent range for physique. For the physics teachers, the corresponding ranges were 81-100 percent and 0-20 percent.

This emphasis on mechanics by year 5 Physique teachers may be explained by the lack of emphasis on other parts of the course as described by the curriculum guideline. This can be exemplified as follows: (1) Only 2 subtopics of Interference and Diffraction were taught by more than 80 percent of the physique teachers; 6 fell in this range for the physics teachers. (2) Sixteen subtopics of How Light Behaves were taught by 41-60 percent of the physique teachers. Only 3 fell in this range for the physics teachers. (3) Only one subtopic of Atomic Structure was taught by at least 61 percent of the physique teachers, but 8 subtopics were taught by more than 80 percent of the physics teachers.

Within each year 3 advance course, the majority of the major headings have a moderate degree of consistency of coverage, indicating that many teachers taught one or more subtopics from a particular major heading, but not necessarily the same subtopics as a teacher in another school. This is particularly true of the major headings How Light Behaves, Interference and Diffraction, and Electricity and Magnetism. It is least true of the mechanics major headings (3-10 inclusive) where most teachers appeared to have taught all the subtopics in the curriculum guideline as well as one or more optional topics. The tendency toward a greater emphasis on mechanics which was observed in the year 5 Physique courses was not particularly evident in year 3 advanced Physique.

As might be expected, year 3 general showed the lowest degree of consistency of coverage among the three courses. Most of its major headings had only a moderate degree of consistency, indicating that teachers were choosing only a few of the subtopics in a heading and that the choice of these subtopics varied greatly from school to school. Electricity and Magnetism constitute an area of strong emphasis for physique teachers. Eighty-one percent taught 8 or more subtopics, while none of the subtopics fell into this range for the physics teachers. For Nuclear Physics 7 subtopics were taught by 41-60 percent of the physics teachers but none were taught by so high a percentage of the physique teachers. Temperature and Heat, and Statics showed the same pattern. Physique teachers did not concentrate to the same degree on the subtopics in these areas. Although year 3 general courses appear to cov r the same major headings as year 3 advanced, the depth of treatment is considerably less. In each major heading, many more subtopics appeared in the 0-20 percent ranges than was the case for the year 3 advanced course.

Year 3 advanced and year 5 courses show some overlap in course content: there appears to be unnecessary duplication in the teaching of certain major headings. In the major topic, Motion, for example, most year 3 advanced teachers covered two subtopics, whereas only one is prescribed in the year 3 Ministry guideline. A third subtopic in this heading was taught by 61-80 percent of the teachers. In both instances, these subtopics are in the year 5 Ministry guideline. This phenomenon can be seen also in subtopics within Newton's Laws-Dynamics of a Particle, Gravity, and How Light Behaves. This tendency to cover subtopics in year 3 advanced which appear in the year 5 but not the year 3 curriculum guideline probably results from the desire of year 3 advanced teachers to prepare their students more thoroughly for the year 5 course.

(b) Time Allocation to Major Content Topics

The amount of class time allocated to each major content topic for each of the six secondary physics courses surveyed is some measure of the consistency with which such topics have been covered. The results of this part of the questionnaire are therefore considered at length (Tables 6.13 and 6.14.)

Because the curriculum guidelines for year 5 and year 3 advanced Physics contain suggested time allocations for the major sections of these courses, these suggested time allocations were compared with the average percentage time computed from questionnaire responses.

The year 5 Physics teachers were not only very consistent across the sample in the time allocation to major topics, but also adhered closely to the time allocations suggested in the Ministry guideline. In almost every major heading, two-thirds of the year 5 Physics teachers made a time allocation within 4 percent of the mean for all teachers. The major exceptions were the headings, Vibrations and Waves, and Atomic Structure, which exhibited the highest standard deviations from the mean, amounting to some 5 percent. Three other topics, Motion, Interference and Diffraction, and Electricity and Magnetism, also had fairly high standard deviations from the mean of over 4 percent.

It is useful also to compare these data with the course content analysis. The major headings which were considered to have only a moderate or low degree of consistency of coverage are some of the same topics which exhibit fairly high deviation from the mean time allotment.

The year 5 Physics teachers were following the time allotment suggested by the Ministry guidelines very closely for all but three major headings: Motion, Electricity and Magnetism, and Atomic Structure. In each of these instances, the teachers spent less time than the guideline suggests. For all other major headings the agreement was excellent. Motion may have received less time than is recommended because it is a topic which was covered extensively in year 3 advanced Physics.

TABLE 6.13

SECONDARY SCHOOL PHYSICS
% OF TOTAL COURSE TIME ALLOCATED

Major Topic	Year 3G $\bar{X}$	Year 3G SD	Year 3A $\bar{X}$	Year 3A SD	Year 5 $\bar{X}$	Year 5 SD
1. Measurement	5.6%	4.2%	4.4%	2.6%	3.2%	2.2%
2. Functions	3.0	3.1	2.8	2.1	3.6	2.1
3. Motion	6.4	4.4	9.4	5.8	10.2	4.3
4. Newton's Laws (Particles)	6.4	3.9	8.1	3.4	8.6	3.3
5. Statics	5.1	5.5	.9	1.8	.5	3.4
6. Newton's Laws (Rigid Body)	1.9	3.8	.7	1.2	.9	1.4
7. Gravity, near the earth's surface	3.0	2.5	5.0	2.0	4.7	1.8
8. Universal gravitation	1.7	2.6	2.7	4.5	4.7	1.9
9. Momentum	.6	1.9	1.7	3.5	7.6	2.9
10. Work, energy and power	7.2	4.8	7.3	5.2	8.0	3.4
11. Vibrations and waves	5.9	5.3	8.3	4.8	6.5	5.0
12. How light behaves	12.2	9.8	12.1	7.4	7.4	3.6
13. Interference and diffraction	3.9	4.5	3.2	5.8	9.6	4.3
14. Electricity and magnetism	16.1	9.1	17.1	10.8	7.1	4.5
15. Atomic structure	3.4	3.6	3.2	3.0	9.0	5.1
16. Nuclear physics	4.1	5.7	3.1	3.4	1.4	2.2
17. Temperature and heat	3.3	6.0	.6	1.8	.1	.5
18. Properties of solids other than thermal	.6	1.6	1.1	1.8	.1	.5
19. Fluids at rest and in motion	4.6	5.4	1.5	3.7	.0	.2
20. Special theory of relativity	.1	.4	.3	.5	.4	.9
21. Properties of elementary particles	.0	.0	.1	.3	.1	.3
22. Other topics	4.7	11.4	5.1	4.3	.4	1.5

TABLE 6.14

SECONDARY SCHOOL PHYSIQUE
% OF TOTAL COURSE TIME ALLOCATED

Major Topic	Year 3G $\bar{X}$	Year 3G SD	Year 3A $\bar{X}$	Year 3A SD	Year 5 $\bar{X}$	Year 5 SD
1. Measurement	5.3%	3.7%	5.1%	4.7%	3.5%	1.4%
2. Functions	2.2	3.2	3.6	5.1	4.5	2.4
3. Motion	6.1	4.8	7.6	1.8	11.9	4.3
4. Newton's Laws (Particles)	5.2	4.3	7.7	2.2	9.1	3.6
5. Statics	5.9	4.5	1.5	2.2	1.9	4.1
6. Newton's Laws (Rigid Body)	1.2	1.5	.4	.9	2.0	2.2
7. Gravity, near the earth's surface	2.1	2.0	3.7	2.6	5.3	2.5
8. Universal gravitation	.8	1.4	1.6	1.3	5.5	3.5
9. Momentum	.1	.3	.4	.9	9.1	6.3
10. Work, energy and power	8.2	5.6	8.2	3.3	10.3	6.3
11. Vibrations and waves	6.2	3.5	4.8	4.0	6.4	4.8
12. How light behaves	14.9	6.8	14.5	4.1	9.7	5.3
13. Interference and diffraction	3.4	4.6	4.0	3.9	11.3	10.4
14. Electricity and magnetism	15.7	9.7	20.8	10.4	12.4	12.9
15. Atomic structure	1.8	2.5	1.1	1.4	4.0	5.6
16. Nuclear physics	1.9	2.8	2.0	2.9	.0	.0
17. Temperature and heat	5.1	4.7	3.7	3.8	.0	.0
18. Properties of solids other than thermal	1.6	2.5	1.8	3.4	.2	.9
19. Fluids at rest and in motion	1.4	2.2	1.8	3.2	.0	.0
20. Special theory of relativity	.0	.0	.0	.0	.1	.3
21. Properties of elementary particles	.0	.0	.0	.0	.0	.0
22. Other topics	2.0	4.2	.4	1.3	1.0	2.6

The topics Electricity and Magnetism and Atomic Structure are normally covered towards the end of the school year and some teachers may have found that they did not have the amount of time at the end of the course that the guideline recommended for these topics.

The year 5 Physique teachers were slightly less consistent across the sample and adhered rather less closely to the guideline's suggested time allotment than did the physics teachers. The greatest variation in time allocation occurred in the major headings, Interference and Diffraction, and Electricity and Magnetism, which exhibited standard deviations from the mean of over 10 percent. In four other topics, Momentum, Work, Energy and Power, Light, and Atomic Structure, the standard deviations from the mean ranged from 5 percent to just over 6 percent. Lastly, the time allocations for Motion and Vibrations and Waves had standard deviations from the mean of between 4 and 5 percent. As was observed for the physics teachers, the above-mentioned major headings were, in almost all cases, also those which were considered to have a low or a moderate consistency of content coverage.

The year 5 Physique teachers were deviating most from the guideline's suggested time allocations in the major headings, Momentum, Interference and Diffraction, and Atomic Structure. For each of these, the difference between the mean allotted time and the guideline's suggested time was more than 4 percent. This difference was particularly high for Atomic Structure; the mean allotted time was only 4 percent* of the total time, whereas the suggested allocation is 16 percent. The hypothesis that the physique teachers appeared to be teaching more subtopics of the mechanic major headings (Nos. 3-10) than their physics counterparts is supported by the fact that the physique teachers spent approximately 50 percent more time on these eight major headings than the guideline recommends. (The corresponding figure for the physics teachers was only 7 percent.) As a result, the physique teachers spent much less time on Atomic Structure than their physics counterparts.

*Four percent of the total course time is approximately 4.5 hours of instruction.

The year 3 advanced Physics teachers exhibited a lower consistency of major topic coverage across the sample and also adhered less closely to the Ministry guideline in their time allocation than was the case for year 5 teachers. In the case of five major headings, at least one-third of the teachers made a time allocation which varied by at least 5 percent* from the average for all the instructors. These topics were Motion, Work, Energy and Power, Interference and Diffraction, and Electricity and Magnetism. All but one were rated as having only a moderate degree of consistency of coverage in the course content analysis. The two topics which showed the greatest deviation from the curriculum guideline's suggested time allotment were Electricity and Magnetism and Nuclear Physics. One of these, Nuclear Physics, had a low consistency of coverage and Electricity and Magnetism had only a moderate degree of consistency.

Although they constituted a much smaller sample, the year 3 advanced Physique teachers were more consistent in their time allocations of course material and followed slightly more closely the Ministry's guideline than did their physics counterparts. For only two major topics, Functions, and Electricity and Magnetism, did the standard deviation from the mean exceed 5 percent. There were five such instances in the case of the year 3 advanced Physics teachers. The physique teachers showed the greatest variation of time allotment in Electricity and Magnetism. The standard deviation from the mean for this topic was about 10 percent for both physics and physique teachers. The major headings exhibiting the greatest difference in time allocation from that suggested in the guideline were the same for both year 3 advanced courses, that is, Electricity and Magnetism and Nuclear Physics.

One noteworthy observation is that the year 3 advanced teachers (both French and English) spent far more time in the mechanics subtopics (Nos. 3-10) than the Ministry guideline suggests. For the seven mechanics major headings, the physics teachers spent 61 percent and the physique teachers 55 percent more time on these topics than the guideline recommends.

*Five percent of the total time is approximately 5.5 hours of instructional time.

Because of this extra time commitment to mechanics, the major headings of Electricity and Magnetism, Atomic Structure and Nuclear Physics received much less attention than the guideline suggests.

In general, then, the year 3 advanced courses, both French and English, are moderately consistent and adhere fairly closely to the Ministry guideline, with the exception of the stress on the mechanics subtopics.

Of the three secondary school courses, the year 3 general course displayed the greatest variability in both course content across the sample and in the time allotted to the various major headings. (Because there is no year 3 general curriculum guideline, a comparison between suggested and actual time allocations could not be made.)

In 7 of the 21 major headings one-third of the physics teachers allocated an amount of time 5 percent or greater than the mean for all the teachers. These topics were Statics, Vibrations and Waves, Light, Electricity and Magnetism, Nuclear Physics, Temperature, Heat and Fluids. As was the case in the year 3 advanced course, Electricity and Magnetism showed the greatest standard deviation from the mean, amounting to some 9 percent. Approximately 5 percent of the course time was spent on 'other topics' not listed in the physics matrix; however, the standard deviation from this mean was 11 percent, indicating a large degree of variability in other topics among these teachers.

The year 3 general Physique teachers allotted approximately the same amount of time to each of the major headings as did the physics teachers; however, the former exhibited a far greater consistency of content coverage across the sample, in spite of its small size. Only three of the major headings exhibited a standard deviation from the mean of over 5 percent. These were Work, Energy and Power, Light and Electricity and Magnetism. As was the case for the physics teachers Electricity and Magnetism displayed the greatest variation, the standard deviation from the mean being approximately 10 percent. For both the physics and physique teachers, those major headings showing the greatest variation in time allotment were rated also as having a moderate degree of consistency of coverage.

(c) Student Achievement at Entry and Exit

Tables 11.36-38 and 14.37-39 inclusive in Volume 2 present a complete analysis of student achievement entry and exit levels in each of the six courses sampled, as perceived by their teachers for each of the subtopics in the 21 major topic headings. It should be noted that the data in these tables represent the perceived achievement levels of the students regardless of whether the subtopic was taught in the course. The data were presented in this manner because the crucial issue in the interface is a comparison of the secondary school exit achievement level and the college or university entry level, independent of the level or course in which the student has gained the particular knowledge in question. In general, these data indicate an orderly progression through year 3 and year 5 Physics courses. Perceived student achievement entry levels in year 5 for subtopics covered in year 3 advanced courses are midway between the year 3 advanced course mean entry and exit levels. This is consistent with the retention loss which might be expected between the end of year 3 and the start of year 5. The perceived student achievement exit level at the end of year 5, however, almost always exceeds the year 3 advanced exit level in subtopics covered in both levels. Year 3 advanced and year 3 general courses typically have similar perceived entry levels; generally the exit level from year 3 advanced exceeds that in year 3 general courses, as one would expect. The perceived student achievement entry and exit levels of physique courses consistently coincide with those for physics courses, although standard deviations for physique courses often are larger, despite the smaller sample. This greater variation in physique also was evident in the analysis of percentage of time allocated to major topics, and therefore substantiates the probability of a greater variation in content of courses and entry-exit levels across the physique courses than in the physics sample.

Some caution should be exercised in interpreting these data. Secondary school physics departments are small. In many instances, physics teachers have classes both at the year 3 and year 5 level.

This close collaboration probably caused the perceived entry and exit levels in year 3 and year 5 courses to appear more orderly and consistent than they might be if independent judgments were made. Moreover, year 5 teachers appeared to have rated student achievement entry and exit levels too highly. Three pieces of evidence support this hypothesis:

(1) In subtopics in which the material cannot be treated with the mathematical sophistication related to a rating of 'three' or 'four' on the designated rating scale, many year 5 secondary school Physics teachers still used the upper end of the rating scale. This phenomenon can be observed in year 5 entry-exit data for specific sutbtopics under major headings 1 and 2, Measurement and Functions.

(2) A comparison of year 5 exit and university entry perceptions reveals a misfit in that perceived university entry levels often were below the perceived entry level for year 5. This fact will be discussed further when the university data are examined, and in the secondary school-university interface analysis.

(3) For subtopics taught both in year 3 advanced and year 5, there was a tendency for the year 5 entry-exit data to be too high when compared to university entry levels. If, however, the subtopic was not taught in year 3, there was a much better fit between exit and university entry perceptions.

This use of the high end of the rating scale by year 5 Physics teachers may be explained by the natural tendency for these teachers to view the rating scale in relation to the students with which they are familiar. As already mentioned, these secondary school teachers typically are involved in both year 3 and year 5 Physics. Thus they would have a tendency to use the entire rating scale to describe student achievement, the lower part of the scale describing student achievement in year 3, and the upper part, year 5.

3. *TEACHING METHODS*

(a) Methods of Instruction

Tables 6.15 and 6.16 illustrate the teaching methods which were used by the physics and physique teachers respectively in the six secondary school courses sampled in the study.

The variation in the use of a particular teaching method within each of the six courses in general exceeds the variation among the six different courses. In fact, the extent to which each method was used varies surprisingly little across the six courses surveyed.

The Socratic method consistently ranked as the teaching method most used in all the physics courses, accounting on an average for over 25 percent of the course instruction time--more in year 5 Physics. Laboratory work, including experiments, was the second most popular method. The lecture method was used by over 90 percent of physique teachers, albeit to a fairly limited extent. It was less popular with physics teachers, especially in year 3 general, where nearly 30 percent did not use it at all.

Demonstrations and classroom study accounted, on average over the six courses, for somewhat more than 10 percent of the teaching time. Testing and audiovisual presentations also accounted for approximately the same amount of time in physics courses, but consistently occupied considerably less time for their physique counterparts.

Physique teachers were asked to estimate the percentage of the course that was taught in French. For year 3 advanced, 100 percent of teachers claimed the course was taught entirely in French; for year 3 general, only 82 percent taught all the course in French, and for year 5 it dropped to 75 percent.

(b) Student Out-of-Class Work

As would be expected, the number of hours spent by students on a course outside of class time varied directly with the level of the course. For the year 3 general courses, approximately half the teachers stated that students spent up to 15 minutes out of class on their course for every hour of class time. Some 40 percent of the physics teachers and about 30 percent of the physique teachers said that students spent between 15 and 30 minutes on their course for every hour of class time.

TABLE 6.15

SECONDARY SCHOOL PHYSICS
TEACHING METHODS

	% of Teachers Using for % Range of Time														
	Year 3G					Year 3A					Year 5				
	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%
Lecture	29%	42%	17%	5%	7%	16%	44%	28%	6%	6%	20%	36%	18%	14%	12%
Socratic	5	17	29	22	27	2	14	30	22	32	2	10	16	28	44
Demonstrations	5	80	15			2	74	22	2		4	92	4		
Laboratory work, experiments	2	17	39	27	15	2	22	40	20	16	0	34	30	26	10
Classroom study	12	56	22	10		6	62	30		2	16	50	24	8	2
Individualized instruction	78	18	2	2		78	16	4		2	90	6	4		
Seminar, tutorial	88	12				90	10				82	14	4		
Small group activities	59	34	7			68	30	2			76	18	6		
Student presentations	88	12				82	18				76	24			
Testing		80	20				90	10			2	94	4		
Audiovisual	15	80	5			14	84	2			10	80	10		
Field trips	76	24				84	16				80	20			

TABLE 6.16

SECONDARY SCHOOL PHYSIQUE
TEACHING METHODS

Method	% of Teachers Using for % Range of Time														
	Year 3G					Year 3A					Year 5				
	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%
Lecture	9%	55%	18%		18%	8%	59%		8%	25%	8%	50%	8%	18%	16%
Socratic	9	27	37		27	17	8	25	17	33	0	25	25	25	25
Demonstrations	27	46	18	9		8	67	25			8	84	8		
Laboratory work, experiments	0	18	37	27	18	0	50	26	8	16	0	42	34	8	16
Classroom study	0	73	18		9	25	42	33			8	42	42		8
Individualized instruction	64	18	9	9		67	25	8			75	17	8		8
Seminar, tutorial	100					92	8				84	8	8		
Small group activities	45	45	10			58	25	17			50	42	8		
Student presentations	64	36				92	8				83	17			
Testing	55	45				33	42	25			25	67	8		
Audiovisual	27	73				33	67				25	67	8		
Field trips	91	9				92	8				83	17			

Approximately 36 percent of all year 3 teachers believed that students spent up to 15 minutes working outside of class on their course for every hour of class time. Another 40 percent estimated between 15 and 30 minutes out-of-class work with the majority of the remainder reporting from 45 minutes to an hour. In one advanced class the average was given as exceeding an hour.

In year 5 about 26 percent of the teachers reported as little as half as much time spent out of the classroom as in it. A further 15 percent felt that their students worked from half to three-quarters of an hour, while 41 percent estimated out-of-class work as three-quarters to a full hour. The remaining 18 percent reported out-of-class work in excess of in-class time. While the number of cases (11) is rather small to draw definite conclusions, over one-quarter (3 out of 11) of the physique teachers indicated out-of-class work exceeded in-class work in time; only about a sixth of the physics teachers did so.

(c) Provision for Individual Progress

In each of six courses, about 80 percent of the teachers did not structure courses so that students could progress at their own rate, and most of the remaining 20 percent did so only to a small extent.

(d) Amount of Time Spent Reviewing

The vast majority of all the teachers in both course years (131 of 174) reported review time at 10 percent or less. Time in excess of 20 percent was required by 2 teachers of year 5 Physics and by the same number in year 3 advanced and by 5 in the general course where one teacher reported spending between 41 and 50 percent of class-time on review of earlier work. This contrasts with the physique courses where there were no reports of review requiring more than 20 percent of class time.

(e) Teaching Resources

For teachers in all physics courses except year 3 general Physique, one main text constituted the primary resource, with over one-third of teachers in these 5 courses claiming heavy use.

TABLE 6.17

SECONDARY SCHOOL PHYSICS
TEACHING RESOURCES

Resource	Use by % of Teachers								
	Year 3 G			Year 3A			Year 5		
	Not at all	Slight or moderate	Great	Not at all	Slight or moderate	Great	Not at all	Slight or moderate	Great
Main text	15%	54%	31%	2%	51%	47%		40%	60%
Main text, plus supplementary text(s)	40	55	5	35	52	13	26	68	6
Two or more main texts	65	30	5	58	36	6	60	34	6
Reference books, dictionaries, encyclopedias	36	61	3	26	72	2	20	80	
Individualized learning packages	72	20	8	72	24	4	83	15	2
Other classroom resources	42	55	3	52	48		47	53	
Audiovisual media	17	76	7	12	84	4	10	80	10
Mimeographed material	5	68	27	6	63	31	24	48	28
Other	94	6		89	7	4	88	8	4

TABLE 6.18
SECONDARY SCHOOL PHYSIQUE
TEACHING RESOURCES

Resource	Use by % of Teachers								
	Year 3G			Year 3A			Year 5		
	Not at all	Slight or moderate	Great	Not at all	Slight or moderate	Great	Not at all	Slight or moderate	Great
Main text	45%	55%			50%	50%	8%	59%	33%
Main text, plus supplementary text(s)	36	64		42	58		33	59	8
Two or more main texts	64	36		92	8		66	17	17
Laboratory equipment		45	55	8	75	17	8	50	42
Mimeographed material	9	36	55	33	33	33	8	59	33
Reference books, dictionaries, encyclopedias	46	45	9	33	67	42	58		
Individualized learning packages	55	36	9	50	42	8	92	8	
Audiovisual media	36	55	9	33	67		17	83	
Other classroom resources	82	18		92	8		100		

In year 3 general Physique, primary reliance appears to be about equally placed upon laboratory work and mimeographed materials--indeed, in all six courses, especially at the year 3 level, mimeographed materials constituted a major resource with over 60 percent of teachers claiming heavy or moderate use.

At least one-third of year 3 general Physique teachers made great or moderate use of individualized learning packages, but only a very small percentage of teachers from the other 5 courses indicated even moderate use of this resource. (See Tables 6.17 and 6.18)

4. ASSESSMENT OF STUDENT WORK

(a) Exemptions from Final Examinations

For each of the three physics courses, approximately 70 percent of the teachers indicated that exemption from the final examination was possible; another 20-25 percent did not permit it, and in the remainder of cases, no final examination was given in the course taught. The teachers in year 3 general and advanced Physique courses were evenly divided on this question: approximately one-third adopted each of the three above-mentioned alternatives. In year 5 Physique there were relatively more teachers (2 of 12 vs 3 of 50) reporting no final examination requirement, but for those schools where one was given the percentage of physique teachers reporting mandatory exams (50 percent) was roughly twice that for those teaching physics.

Exemption from final exams was granted in most cases on the basis of 60 percent on the whole year's work (59 out of 86 cases in which marks alone counted). Eleven others indicated that 50 percent was necessary while 16 required 65 percent or more. In 19 cases other conditions as well as marks were cited. These included attendance, general behaviour and teacher recommendation.

(b) Final Mark Allocation

Tables 6.19 and 6.20 illustrate the methods of evaluation employed by the physics teachers in the six secondary school courses sampled.

TABLE 6.19

SECONDARY SCHOOL PHYSICS
FINAL MARK ALLOCATION

Item	Allocation by % Ranges														
	Year 3G					Year 3A					Year 5				
	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%
Final examination			17%[a]	50%	33%			10%	40%	50%			17%	33%	50%
Mid-term examination	15	5	22	27	31	16	6	20	20	38	18	4	28	20	30
Other written tests	5	8	19	19	49	2		18	16	64	4	2	4	30	60
Other oral tests	93	7				92	8				96	4			
Problems, exercises	22	51	20	7	4	34	46	18	2		42	38	18		2
Laboratory reports and/or notebooks	15	42	32	7	4	20	30	28	18	4	18	24	44	8	6
Laboratory and/or other class participation	39	37	17	5	2	62	28	8		2	62	22	12	4	
Individual papers (essays, reports, etc.)	63	27	7	3		62	32	4	2		74	26			
Group or team papers, projects	85	12	3			84	16				94	6			
Individual projects (exclusive of essays, reports)	78	15	5	2		90	8	2			88	6	6		
Effort	63	32	5			78	20	2			78	22			
Attendance	85	15				92	8				90	10			

[a] % of teachers in each % range

TABLE 6.20

SECONDARY SCHOOL PHYSIQUE
FINAL MARK ALLOCATION

Item	Allocation by % Ranges														
	Year 3G					Year 3A					Year 5				
	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%
Final examination	27%[a]	18%	10%	18%	27%	37%	18%	18%	9%	18%	34%	8%	25%	8%	25%
Mid-term examination	45	10	18	27		37	9	9	27	18	42		25	25	8
Other written tests	9	18	18	18	36	9	9	18	9	55	8		17	17	58
Other oral tests	100					82	18				92	8			
Problems, exercises	18	46	36			36	55	9			25	42	25	8	
Laboratory reports and/or notebooks	27	36	27	10		9	64	27			8	42	50		
Laboratory and/or other class participation	45	55				64	36				67	33			
Individual papers (essays, reports, etc.)	55	36	9			45	55				50	50			
Group or team papers, projects	91	9				73	27				92	8			
Individual projects (exclusive of essays, reports)	82	9	9			55	36	9			83	17			
Effort	64	36	10			73	27				83	17			
Attendance	82	18				82	18				83	17			

[a] % of teachers in each % range

Mid-term examinations accounted for about 25 percent of the final mark for all courses but the year 3 general and year 5 Physique courses, where they accounted for 15 percent. Other written tests were weighted more heavily, accounting for one-third of the final mark for the two year 3 general courses, nearly 40 percent of the final mark for the two year 3 advanced courses and the year 5 Physics course, and for about 25 percent of the final mark for the year 5 Physique course.

Problems and exercises accounted for about 10 percent of the final mark. Fifteen percent of the final mark was attributed to laboratory reports and/or notebooks for the three physics courses; this percentage was slightly smaller for the three physique courses. Individual papers, group or team papers, and individual projects accounted for very little of the final mark when considered separately. Oral tests and attendance were virtually unused as a means of evaluation in any of the six courses sampled.

(c) Analysis of Current Examinations

A study of examinations which were administered during 1975-76 in secondary school physics courses sampled was carried out for two reasons: first, to ensure that the content of the material which was used in this study to gather information did in fact cover the topics taught in the secondary school; and second, to determine the content validity of examinations administered in the secondary school physics courses surveyed.

In the first instance, the extensive list of subtopics in the physics matrix used in this study was found to cover almost all topics taught in the secondary school courses. The only exception was in year 3 general courses, where the applied nature of some of the content sometimes made it difficult for instructors to relate to the more theoretical format used in the matrix.

An analysis of the validity of current examinations was undertaken by comparing the allocation of marks on examination papers with the subtopics covered and the percentage of total course time which teachers allocated to various major topics as described previously.

Two factors made such an analysis less than precise. First, as described previously, there were a number of techniques used to determine final grades and the standard deviation for each of these was large, indicating a great deal of variation across the sample. Secondly, many examination papers did not indicate a mark allocation. Because of the small number of returns, current examinations in physique courses were not included in this analysis.

Of the three secondary school physics courses, the year 5 course examinations agreed most closely with the course content and time allocation described by the teachers. It was possible to detect a slight concentration on questions for mechanics (particularly Motion) at the expense of the headings Vibrations and Waves, How Light Behaves, and Interference and Diffraction. In general, however, the year 5 examinations exhibited a high level of consistency from one school to another. In contrast with the examinations for year 3 Physics courses, the year 5 examinations most frequently consisted of only problems. Only rarely were there questions asking for an explanation or description of an event. Even rarer were discussion-type questions. If these occurred, they were concerned with the wave and particle models of light.

Although the year 3 advanced Physics examinations were fairly consistent across the courses sampled, they did exhibit more variation in examination coverage of the course material than did the year 5 examinations. They were less consistent from school to school and also did not agree as closely with the course content and time allocation for the course material as described by the teachers. For example, several examinations contained questions more suitable for year 5 (in comparison with the curriculum guideline), particularly in the areas of mechanics and Atomic Structure. In structure, the year 3 advanced examinations also differed from the year 5 examinations. Often, 30-40 percent of the examination might consist of multiple-choice questions. Questions asking for an explanation of an event, or a definition of a term, or a description of an experiment were much more frequent than in year 5.

As might be expected from the course content and time allocation data uncovered earlier in this report, the year 3 general Physics examinations were the most varied of the three secondary school courses, both in content covered and in the mark allocation to individual sections of the same major heading. Several of the examinations studied reflected the presence of 'other' topics, that is, topics not specifically listed in the physics content matrix. These questions were most often concerned with the technical applications of physical principles studied in the course. In style, the year 3 general examinations also differed greatly from the year 3 advanced examinations. Frequently, a large part of the examination consisted of multiple-choice questions. The other questions were usually quite short, consisting, for example, of a one-step problem or requiring a definition or a brief description/ explanation of an event.

D. Discussion

The data gathered indicate that the teaching of physics in the secondary schools sampled in the province is probably one of the most orderly subjects studied in the project. First, there is a reasonably high level of consistency in the degree to which the same content is covered across the courses sampled. This is substantiated by the analysis of the consistency with which subtopics are taught across the courses in the sample, and is confirmed by the percentage of time allocated to the major headings by teachers. The high level of consistency in the pre- and corequisites which are prescribed for each of the courses also contributes to the consistency of content coverage.

Those topics recommended in the Ministry of Education curriculum guidelines especially are covered with great consistency. It will be recalled that for all courses, especially in year 3 advanced and year 5 courses in the sample, a substantial majority of teachers indicated that the Ministry's guidelines exerted a moderate or great influence on their course.

The consistency is highest in year 5 Physics, where approximately 60 percent of the major topics were rated as having a high consistency of coverage across the courses sampled; it drops slightly in the case of year 5 Physique, in part because of a greater emphasis among physique teachers on the topics and headings which may be described as mechanics. One exception that is of interest to the secondary school/university interface is that the major topics, Measurement and Functions, although prescribed by the Ministry curriculum guide, were rated as having only a moderate degree of consistency of coverage by year 5 Physics teachers.

Although there is less consistency in the degree to which the course content is covered in courses sampled in year 3 advanced and general courses, it is still reasonably high. About 40 percent of the major topics in year 3 advanced Physics and both year 3 general courses were rated as having a high consistency of coverage across the sample; almost all the rest of the topics were rated as having a moderate consistency of coverage. In the case of year 3 advanced Physique, almost 50 percent of major topics rated as high.

Two factors contributing to less consistency of coverage in year 3 physics courses as compared to year 5 are the curriculum guidelines and textbooks. First, the Ministry of Education guidelines were prepared before 1970, at a time when there was only one year 3 physics course. When two courses were created, decisions about the division of content were made at the local level. Second, a single textbook was recommended for use in the year 5 curriculum guide and this text is still widely used across the province. Only one-half of the year 3 advanced courses sampled used the same text; various other texts used have quite different approaches to the subject. Two of these other texts were used commonly in the year 3 general course.

A predilection among year 3 advanced teachers to cover year 5 content subtopics to a degree not prescribed in the Ministry's guidelines should be noted here. This tendency can be seen in the subtopic coverage analysis, is confirmed by the percentage of time devoted to major topics, and can be seen in the relatively high perceived exit levels in subtopics under Motion for year 3 advanced students.

The data gathered from physics teachers regarding the perceived level of student accomplishment on entry to and exit from the courses sampled also indicate a consistent and orderly progression from year 3 advanced courses through the year 5 courses.

The widely perceived variation among students coming into secondary school physics courses, of course, presents problems to the teachers, but in year 5 this difficulty is not perceived by the teachers as being too great. This may be because the population of secondary school physics courses, particularly in year 3 advanced and year 5, includes largely students with a particular aptitude and interest in the subject. This group of students comprises a small percentage of the total secondary school population and the influence of this factor is reflected in both first year college and university courses, where a surprisingly large number do not specifically prescribe year 3 or year 5 Physics courses as prerequisites. At the university level, however, it is probably that a de facto prerequisite requirement exists in that few students without year 5 Physics attempt to take either 'major' or 'minor' first year university Physics courses.

COLLEGE PHYSICS/PHYSIQUE YEAR 1

A. The Sample

1. THE POPULATION OF COURSES

There is a large and varied number of first year physics courses in the 15 colleges that participated in this study, and a rather broad classification scheme was developed. A course was considered to be a "multi-topic" course if it included three or more of the following: Mechanics, Properties of Matter, Heat and/or Thermodynamics, Optics, Electricity and/or Magnetism, Modern Physics and Waves and/or Sound. The majority of courses fell into this category. A course was considered to be solely a "mechanics" course if its content was restricted to one or more of Statics, Kinematics, Dynamics, Hydrostatics and Fluid Dynamics. Courses labelled as "other" either included only one or two of the topics listed above under "multi-topic courses" or they covered specialized topics such as Radiologic Physics, Astronomy, or the Physics of Music. Two of these "other" courses were remedial in nature, covering the material of year 3 Physics. One college offered most of its first year physics courses both in French and English.

In the first year college physics, each department and/or program which required its students to take physics appears to have designed and offered a physics course for its own students. One large college sampled went to the extreme of offering 16 different first year physics courses. This fact largely explains the number and variety of courses offered. These courses, categorized according to the above scheme, are presented in Table 6.21. Although an examination of the college calendars indicated that physics was taught in discrete and separate one semester courses, responses to the questionnaire and interviews with department heads indicated that in some instances, the first semester course formed one part of a two or three part introductory physics course.

TABLE 6.21

COLLEGE PHYSICS
FIRST YEAR COURSES IN THE SAMPLE

Nature of course	Courses Offered		Courses Selected	
	English	French	English	French
Multi-topic	73	13	28	3
Mechanics	38	7	9	0
Electricity	26	7	0	0
Other	21	3	2	0
Total	158	30	39[a]	3

[a]A single questionnaire was used by one respondent to describe both the first and second semester physics courses he taught.

Personal interviews with the heads of physics departments in 11 of the 15 colleges in the sample provided background information about the teaching of first year physics from the inception of the college system in the province almost a decade ago. All 11 colleges reported that the first year courses which had been selected for analysis in this study were typical of the course offerings in their department. The majority stated that there had been no significant change in the number of course offerings since their program began. There were very few instances in which formal remedial courses had been established, but most reported that first year physics courses had been adjusted to contain more review and remedial work, and that in general there had been a reduction in course content and a gradual switch of emphasis from a theoretically oriented approach to a more applied one.

There were no discernible trends in teaching methods across the colleges interviewed, but colleges had definitely moved away from heavy emphasis on the final examination in determining the final mark toward greater stress on class work in assessing students.

Most of the department heads felt that the attitudes and motivation of incoming students had improved considerably over the past few years, but could not agree on whether student achievement levels had improved or declined in recent years.

2. NATURE OF COURSES SAMPLED

The sample of first year physics courses selected for analysis included 31 courses categorized as multi-topic, 9 of the 45 mechanics courses, and 2 of the "other", for a total of 42 (Table 1). No electricity courses were sampled, because these were labelled specifically as electricity courses for the electrical or electronics technologist/ technician rather than as physics courses. These were included in the analysis of the total population of courses because most covered basically the same material as the electricity section of the year 3 course.

Three of the 31 multi-topic courses sampled were offered in French. Because the college calendar indicated that 2 of the 3 physique courses sampled were the equivalent of courses offered in English, the course content of these 2 physique courses and that of their English counterparts was compared, using the responses of the instructors to questions about the specific subtopics taught in the course. In one instance, French and English versions of the course were essentially the same; in the second, the two courses were substantially different. In this latter instance, the physique version of the course deviated substantially from its calendar description.

The courses selected for detailed analysis represent a good sampling of those first year college courses which were classified as multi-topic and mechanics. The course content of the electricity courses was deemed too specific for purposes of the secondary school-college interface analysis. The two other courses selected for analysis were included in the descriptive analysis but not in the analysis of the percentage of total class time allocated to each major content topic, because they tended to emphasize a more limited number of major topics than did either multi-topic or mechanics courses. The data from the 3 physique courses have been included in the descriptive analysis which follows, but because there remained only 2 first year physique college courses whose content differed substantially from that of the English-language courses studied, a detailed analysis of their course content was not undertaken.

B. Factors Influencing The Teaching Of The Course

1. BACKGROUND OF INSTRUCTORS

The great majority of physics instructors, 84 percent had taught in a community college for over six years, and 42 percent had taught the courses they were presently teaching for at least that long. The three physique instructors had all taught for more than 3 years.

The majority of instructors held either a Master's degree (40 percent) or an Honours Bachelor's (38 percent). Most of the remainder held Bachelor's degrees. Eighty-nine percent were teaching in their area of specialization or in an area closely related. Two of the three physique instructors held an Honours Bachelor's, the third a Bachelor's degree. A substantial minority of physics instructors (23 percent) and all 3 physique instructors had previous secondary school teaching experience.

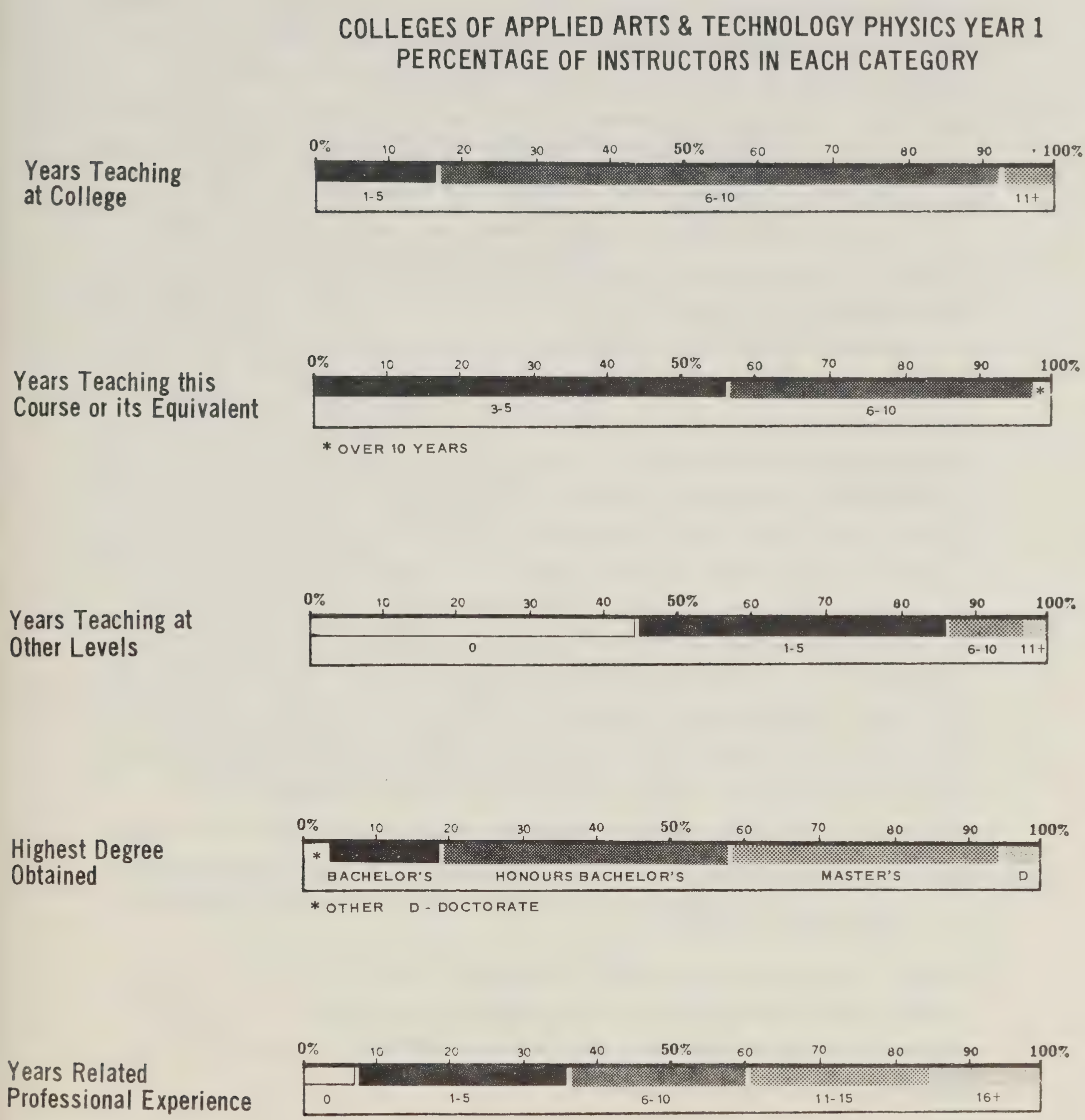
2. PREREQUISITES AND COREQUISITES

The prerequisite and corequisite requirements for students entering programs which include first year physics courses in the 15 colleges sampled are listed below. All colleges required a secondary school graduation diploma (SSGD) and most required specific secondary school mathematics and science courses. Ten of the 15 colleges sampled required year 4 Mathematics and year 3 Physics for students entering Technology or Health Sciences programs (the Health Sciences programs also usually required a biology course). If those colleges which required a senior mathematics and a senior science course are included, 13 of 15 colleges in the sample can be said to require at least one senior mathematics course and one senior science course.

Prerequisite	No. of Colleges
Year 4 Mathematics, year 3 Physics	5
Year 4 Mathematics, year 3 Physics, year 4 Chemistry	5
Credits in senior Mathematics and Science	3
SSGD only	1
Year 4 Mathematics, English	1
	15

Figure 12

BACKGROUND OF INSTRUCTORS



3. *QUALITY OF PREPARATION OF INCOMING STUDENTS*

(a) General Physics Preparation

Of college physics instructors sampled, 84 percent believed that the preparation of incoming students varied greatly; most of the remainder thought it moderately variable. Two of the three physique instructors agreed with this latter estimate. No fewer than 92 percent of physics instructors-and all the physique instructors-rated the quality of preparation of incoming students as fair or poor, despite the fact that most courses had senior science and math prerequisites. Only 8 percent were prepared to consider that students had been well prepared.

As with the secondary school data, one can give meaning and substance to these general impressions by examining degrees of dissatisfaction with entry levels across a broad range of subtopics for which student achievement entry-exit data and percentages of time allocated were requested. Table 6.22 lists, for each of 21 major topic areas, the mean percentage of physics instructors who desired a higher level of achievement at entry. Instructors clearly were least satisfied with achievement levels in the areas of Measurement, followed by Work, Energy and Power and Gravity - Near the Earth's Surface. In general, too, fewer of those topics for which they expressed greatest satisfaction with entry levels - Electricity and Magnetism, Atomic Structure, Properties of Solids other than Thermal, Special Theory of Relativity, and Properties of Elementary Particles - were taught widely across the college courses sampled. It should be noted, however, that in no case was a majority of instructors dissatisfied with the entry level of students for any one given topic; these perceptions of achievement in precise areas indicated a higher level of satisfaction than did the responses to the more general questions discussed above.

(b) Mathematical Skills

College instructors were asked to indicate whether or not entering students were expected to have acquired any of 14 mathematical skills listed in the questionnaire, and if so, whether or not students were competent in these skill areas.

TABLE 6.22

COLLEGE PHYSICS YEAR 1
PERCENTAGE OF INSTRUCTORS PREFERRING A HIGHER LEVEL OF STUDENT COMPETENCE

Major Topic	%[a] of Instructors
1. Measurement	45%
2. Functions	26
3. Motion	22
4. Newton's Laws of Motion - Dynamics of a Particle	26
5. Statics	23
6. Newton's Laws of Motion - Dynamics of a Rigid Body	20
7. Gravity - Near the Earth's Surface	29
8. Universal Gravitation	11
9. Momentum	14
10. Work, Energy and Power	32
11. Vibrations and Waves	13
12. How Light Behaves	24
13. Interference and Diffraction	11
14. Electricity and Magnetism	2
15. Atomic Structure	5
16. Nuclear Physics	8
17. Temperature and Heat	25
18. Properties of Solids other than Thermal	4
19. Fluids at Rest and in Motion	12
20. Special Theory of Relativity	5
21. Properties of Elementary Particles	5

[a]To obtain the mean percentage, percentage of instructors dissatisfied with each subtopic under the major heading was averaged.

There were 4 mathematical skills which the vast majority of instructors did not expect students to have developed: the ability to integrate simple functions, to differentiate functions, to apply the binomial expansion, and to use vector algebra. Two-thirds of the instructors did not expect students to be able to use trigonometric identities. Only a very small percentage of those who expected entering students to be competent in these two skills found that they were.

Half the instructors did not expect students to be able either to use exponential functions or to convert degrees to radians. None of those who expected students to use exponential functions and only two-fifths of those who expected students to be able to convert degrees to radians found that their students actually were competent in these two skills. About two-thirds of the instructors expected students to be able to use logarithms, to be able to solve simultaneous linear equations, and to find the roots of quadratic equations. In the first two instances, the instructors' expectations were almost never realized by incoming students. For roots of quadratic equations 81 percent of the instructors found incoming students to be incompetent.

There were three mathematical skills which the vast majority of college instructors expected students to have mastered prior to entering their courses: the ability to manipulate linear equations, to use concepts of ratio and proportion, and to be able to use trigonometric functions. An average of only 24 percent of the college instructors reported finding competency in these three mathematical skills.

4. *OTHER FACTORS INFLUENCING THE TEACHING OF THE COURSE*

Four factors appeared to be of particular importance: information instructors had concerning courses, programs, and career patterns the majority of students take upon successfully completing these courses; the relationship between the courses the instructors were presently teaching and others which their students were taking concurrently; the course outline assigned to the instructors; and the knowledge entering students had about physics.

TABLE 6.23

COLLEGE PHYSICS YEAR 1
FACTORS INFLUENCING THE TEACHING OF THE COURSE

Factor	% of Instructors Influenced			
	Not at all	To a small extent	To a moderate extent	To a great extent
Interests of students	6%[a]	15%	56%	23%
Students' knowledge	14	14	29	43
Relationship with concurrent courses		24	30	46
Information on students' future plans	8	13	29	50
Assigned course outline	13	13	34	40
Teachers' special interests or training	8	21	47	24
Principal text(s)	6	27	40	27
Staffing	61	12	12	15
Other	83	3	7	7

[a] % of instructors in each category.

On the average, 45 percent of instructors reported being influenced to a great extent by these four factors. Of lesser importance were the interests of students, instructors' special interests or training, and the content and approach of the principal text(s) used in the course, with an average of 48 percent of the responses being in the category "to a moderate extent" for these three factors (see Table 6.23).

College physique instructors (paralleling perceptions by secondary school physique teachers) reported that the factors most influential in their teaching were the knowledge of physics which the incoming students had, their own special interests and training and the course outlines which were assigned to them.

C. Characteristics Of The Course

1. *AIMS OF THE COURSE*

Instructors were asked to indicate the degree to which several stated general aims of physics courses were emphasized in their own course. The results are presented in Table 6.24.

College instructors, similar to secondary school and university instructors, placed great emphasis on developing the ability to think rationally, especially on being able to organize data and arrive at a solution. Another aim greatly stressed was, as one would expect, the ability of students to recognize and understand technological and engineering activities as applications of physics; 95 percent of instructors placed great or moderate emphasis on this.

The other responses in general presented few surprises when compared with secondary school and university data. One would expect a broad consistency across the 3 levels studied in the emphasis of such aims, and this indeed proved to be the case.

TABLE 6.24

COLLEGE PHYSICS YEAR 1
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	No emphasis	Very little	Moderate	Great
1. The student should acquire an attitude of scientific curiosity	3%[a]	16%	47%	34%
2. The student should be able to think rationally and in particular be able to:				
a. organize data presented and arrive at a solution	3	5	13	79
b. evaluate in empirical terms reports of observed phenomena	16	18	29	37
3. The student should understand the scientific method	10	16	45	29
4. The student should be able to apply the scientific method to the study of the behavior of matter under the influence of the forces of nature and to the study of the properties of those forces including:				
a. the ability to design and set up an experiment	20	37	26	17
b. the ability to collect experimental data	17	11	20	52
c. the ability to organize and analyze experimental data	17	11	17	55
d. the ability to interpret the results of experiments in terms of mathematics and/or physical models	17	23	26	34
e. the ability to communicate the results of experiments concisely, critically and profitably with knowledge and understanding	11	17	23	49
5. The student should recognize technological and engineering activities as applications of the principles of physics and aim to understand these activities in such terms		5	40	55
6. The student should be aware of the historical development of ideas and concepts in physics and the evolving nature of its theories	13	55	32	

[a] Percentage of instructors in each category

2. THE OBJECTIVES OF THE COURSE

(a) Course Content

Table 6.25 provides an overview of the content topics of first year college physics courses analyzed in this study. This table is constructed in the same fashion as those for course content data at the secondary school and the university levels: the method of analyzing the data is explained in the appropriate secondary school content section.

The college courses sampled were less consistent in coverage of content than either the secondary school or the university courses. No subtopic within any major heading was taught by more than 80 percent of the instructors. Only four major headings were taught by fewer than 20 percent of the instructors. Two of these, Special Theory of Relativity and Properties of Elementary Particles, would not normally be covered in a first year college course. The others, Electricity and Magnetism and Atomic Structure, would more properly be covered in an Electricity course than in a physics course, and most colleges offered separate Electricity courses. Two of the major headings evidenced an especially low degree of consistency: Gravity - Near the Earth's Surface and How Light Behaves. In both of these, the majority of the subtopics were taught by 41-60 percent of the instructors. Of the remaining 15 major headings that were covered by 20-80 percent of instructors, 7 were taught by fewer than 40 percent of the instructors.

The majority of the college instructors are covering some of the subtopics only in the following major headings: Measurement, Motion, Newton's Laws - Dynamics of a Particle, Universal Gravitation, Work, Energy and Power, and Temperature and Heat.

(b) Time Allocated to Major Content Headings

Table 6.26 presents data regarding the amount of class time which first year college physics instructors allocated to each of the major content topics.

TABLE 6.25

COLLEGE PHYSICS
EXTENT TO WHICH MAJOR TOPICS ARE TAUGHT

High Consistency		Moderate Consistency[a]	Low Consistency[b]
Covered by >81% of Teachers	Covered by <20% of Teachers		
	Electricity and Magnetism	Measurement	Gravity
	Atomic Structure	Functions	How Light Behaves
	Special Theory of Relativity	Newton's Laws (Particles)	
		Statics	
	Properties of Elementary Particles	Newton's Laws (Rigid Body)	
	Universal Gravitation	Momentum	
		Work, Energy, Power	
		Vibration & Waves	
		Interference and Diffraction	
		Nuclear Physics	
		Fluids	
		Properties of Solids	
		Temperature and Heat	

[a] Coverage Scattered

[b] Many subtopics covered by 41-60% of teachers

TABLE 6.26

COLLEGE PHYSICS YEAR 1
TIME ALLOCATIONS

TOPIC	% of Total Class Time Allocated $\bar{X}$	SD
1. Measurement	6.2%	4.7%
2. Functions	2.8	3.1
3. Motion	6.9	6.6
4. Newton's Laws (particles)	7.4	6.2
5. Statics	3.2	4.4
6. Newton's Laws (Rigid Body)	4.2	5.0
7. Gravity - Near the Earth's Surface	3.2	3.2
8. Universal Gravitation	1.7	2.3
9. Momentum	2.7	3.2
10. Work, Energy, and Power	6.7	5.2
11. Vibrations and Waves	6.2	7.4
12. How Light Behaves	7.7	7.7
13. Interference and Diffraction	5.5	11.8
14. Electricity and Magnetism	2.5	6.6
15. Atomic Structure	3.0	6.9
16. Nuclear Physics	3.2	6.4
17. Temperature and Heat	10.0	10.6
18. Properties of Solids	2.6	6.7
19. Fluids at Rest and in Motion	3.9	6.5
20. Special Theory of Relativity	1.4	5.5
21. Properties of Elementary Particles	0	.1
22. Other Topics	1.1	2.9

The 35 college instructors who responded to this question displayed a remarkable degree of variability in the percentage of time allocated to major topics. The average time devoted to each major heading, however, did not vary greatly for most of the headings. Temperature and Heat, on average, received the largest amount of time, about 10 percent of the total. Most of the other headings received an average of between 4 and 7 percent of the total course time. However, for 14 of the 21 major headings, at least one-third of the college instructors deviated from the mean time allocation by more than 5 percent. This was particularly noticeable in the heading, Interference and Diffraction, which had a standard deviation from the mean of about 12 percent. This high degree of variability in time allocation reflects the variation in clientele and in the types of courses offered across the first year college physics courses sampled.

As indicated in Section A, some of the first semester college courses sampled clearly were separate one-semester courses while others apparently represented the first part of a whole year course taught over two semesters. In order to determine whether a higher level of time allocation consistency across first year courses would exist if such a distinction were made in the analyses, the time allocation devoted to each of the major headings for each of these two groups was calculated. These analyses did not yield the expected results in that the high degree of variability of time allocation exhibited for the total sample of courses remained essentially the same for each of the two separate groups.

(c) Student Achievement at Entry and Exit

Table 12.19 in Volume 2 presents the data for student achievement entry and exit levels to first year college physics courses as perceived by the instructors of the courses sampled for analysis.

The most notable feature of these data is that the perceived mean student achievement entry level to first year college physics courses consistently hovers around the student achievement entry levels to year 3 Physics courses as perceived by secondary school physics teachers.

TABLE 6.27

COLLEGE PHYSICS YEAR 1
TEACHING METHODS

Method	% of Instructors Using for % Range of Time 0	1-10%	11-20%	21-30%	31+%
Lecture	16%[a]	24%	16%	18%	26%
Socratic	18	42	13	3	24
Demonstrations	29	65	3	3	
Laboratory work, experiments	24	10	8	21	37
Classroom study	34	34	15	8	9
Individualized instruction	82	10	8		
Seminar, tutorial	79	18	3		
Small group activities	87	13			
Student presentations	92	8			
Testing	5	71	21		3
Audiovisual	39	58	3		
Field trips	92	8			
Other	92	3	5		

[a]percentage of instructors.

These perceived entry levels to first year college physics courses do not appear to fluctuate according to the extent to which a given content subtopic is taught at the year 3 level. The student achievement exit levels from first year college physics courses (in most cases, at the end of the first semester) typically range between the mean student achievement exit levels for year 3 courses and those for year 5 secondary school physics courses. Possible explanations for the low perceived mean student achievement entry levels to first year college physics courses will be advanced in Section D.

3. *METHODS OF INSTRUCTION*

(a) Teaching Methods

It is clear from Table 6.27 that a wide variety of methods received some attention at the college level. Laboratory work appears to be emphasized--over one-third of instructors reported that more than 30 percent of class time was so employed. The prime characteristic of Table 6.27, however, appears to be great variability. Both the lecture and the Socratic method were used for over 30 percent of the class time by about 25 percent of instructors, but almost as many made no use of it at all. Demonstrations, audiovisual methods and testing are all employed by a substantial majority, but in general for less than 10 percent of the time. About 60 percent make use of classroom study, but the percentages of time involved vary between 1 and 30. College physique instructors differed from secondary and university instructors in only one outstanding respect: they tended to rely far less on the lecture as a method of instruction.

(b) Student Out-of-Class Work

As one would expect, college physics courses required considerably more out-of-class work than did secondary school physics courses. Twenty-one percent of instructors reported that students spent between one and two hours out-of-class for every class hour. Another 32 percent said that between 45 minutes and one hour was spent.

TABLE 6.28

COLLEGE PHYSICS YEAR 1
TEACHING RESOURCES

Resource	Use by % of Instructors			
	Not at all	Slight	Moderate	Great
Main text	11%	5%	31%	53%
Main text plus supplementary text(s)	53	22	11	14
Two or more main texts or materials from other texts	62	9	17	12
Laboratory equipment	13	16	22	49
Mimeographed materials (lecture notes, etc.)	11	21	34	34
Reference books, dictionaries, encyclopedias, journals, etc.	29	65	3	3
Individualized learning packages	86	8		6
Audiovisual media (television, tapes, filmstrips, etc.)	54	32	11	3
Other	89	3		8

Most of the remainder believed that students spent between 15 and 30 minutes in out-of-class work for each in-class hour.

All of the college physique instructors reported that students spent no more than one half hour in out-of-class work for every hour spent in class.

(c) Provision for Individual Progress

Such flexibility appears to be rather meagerly built into courses at the college level: 63 percent of instructors made no such provision and 21 percent made provision for it only to a small extent. Eight percent made moderate provision and another 8 substantial provision for such progress. College physique responses painted essentially the same picture.

(d) Amount of Time Spent in Review

A rather high percentage of instructors - 13 percent - reported that from 40-50 percent of total class time was used to review material taken in previous courses. Again, however, the responses varied: 26 percent made no such provision; 37 percent spent about 10 percent of the total class/laboratory time in review and 16 percent spent 11-20 percent of the time in review.

(e) Classroom Resources

Table 6.28 reveals a heavy reliance on a main text in college physics courses - 53 percent of instructors use one to a great extent, 36 percent to a slight or moderate extent. Laboratory and/or computer equipment ranks next in order of importance - 49 percent use it to a great extent, 38 percent to a slight or moderate extent. College physique instructors also make very heavy use of mimeographed materials, with laboratory and/or computer equipment running second.

TABLE 6.29

COLLEGE PHYSICS YEAR 1
FINAL MARK ALLOCATION

Item	% Ranges					
	0%	1-10%	11-20%	21-30%	31-40%	41+%
Final examination[a]	73%[b]	13%		8%	3%	3%
Mid-term examination	89	5	3	3		
Other written tests	21	8	5	13	13	39
Other oral tests	94	3	3			
Problems, exercises	58	16	18	3	5	
Laboratory reports and/or notebooks	34	8	10	8	32	8
Laboratory and/or other class participation	81	8	3	5	3	
Individual papers (essays, reports, etc.)	89	3	3	3		3
Group or team papers, projects	100					
Individual projects (exclusive of essays, reports)	97		3			
Effort	79	13	8			
Attendance	87	5	5		3	
Other	76	8	8			8

[a]When respondents indicated that students could be exempted from their final examinations, the final mark allocation was determined by excluding marks assigned for the final examination. When all students were required to write the final examination it was included in the final mark allocation.

[b]% of instructors in each category

4. ASSESSMENT OF STUDENT WORK

(a) Exemption from Final Examinations

Fifty-three percent of college instructors reported giving final examinations; of these, 60 percent would not permit exemption. Exemptions were permitted if the student's mark for the year exceeded 50 percent except in two cases where an A was required.

(b) Final Mark Allocation

For over half of the instructors, tests accounted for more than one-third of the final mark and for 40 percent of the instructors, laboratory reports and/or notebooks carried the same weight. Problems and exercises made some contribution: 34 percent of instructors allocated to them up to 20 percent of the final mark - but few other items received attention from any significant number of instructors. The picture presented in Table 6.29 is quite variable, with very small numbers of instructors reporting for each category.

D. Discussion

Discussion logically focusses upon two aspects of the data gathered about the teaching of first year physics at the colleges sampled in this study: (i) The large amount of variance in the content matter taught in these courses across the sample.

(ii) The low mean student achievement entry level to these courses as perceived by the college instructors.

The wide variability of content in the first year college physics courses sampled was evident both in the detailed analysis of the subtopics covered and in percentages of time allocated to major topics. There is, to begin with, no province-wide curriculum guideline for such courses; first year physics courses are developed independently at each college. The high importance which college instructors ascribed to their own interests and background as an influence upon their teaching, especially when compared to the influence of this factor on secondary school and university teaching, suggests that the individual instructor

TABLE 6.30

SECONDARY SCHOOL AND COLLEGE PHYSICS
COMPETENCY AT ENTRY AND EXIT: SELECTED TOPICS

Topic	Year 3G Physics		Year 3G Physique		College	
	Entry $\bar{X}$	Exit $\bar{X}$	Entry $\bar{X}$	Exit $\bar{X}$	Entry $\bar{X}$	Exit $\bar{X}$
3. Motion (7)	.1	.8	.1	.8	.2	1.5
10. Work, Energy and Power (10)	.3	1.2	.2	1.2	.3	1.8
11. How Light Behaves (26)	.1	1.1	0.0	1.0	.3	.9

Topic	Year 3G Physics		Year 3G Physique		College	
	Entry $\bar{X}$	Exit $\bar{X}$	Entry $\bar{X}$	Exit $\bar{X}$	Entry $\bar{X}$	Exit $\bar{X}$
3. Motion: Straight line kinematics	.6	2.5	.3	1.6	.2	1.9
10. Work, Energy, and Power: Work done by a constant force	.3	1.9	.5	2.0	.5	2.4
11. How Light Behaves: Convex and Concave Mirrors: Scale Drawings	.2	1.8	0.0	1.8	.6	2.1

plays a major role in determining the content of his course, and that his interests and educational background, therefore, also contribute to the wide variation in course content across the college courses sampled.

A relatively large number of different text books are used across the college physics courses sampled. Some of these texts are relatively new; they tend to present content in a manner which will attract initial student interest. Logical sequence and consistency of course content across the sample are adversely affected by this variety in number and style of texts.

Another factor which contributes to the wide variability of course content across the sample is the fact that there is a wide range of first year physics courses offered in most of the colleges sampled. In some instances there are courses specific to each technical field often further subdivided for the technician and technologist.

The second outstanding factor of the college data is the relatively low level of perceived mean student achievement level on entry to college courses. Although there is obviously variation over the 165 subtopics analyzed in the study, these perceived student achievement entry levels are consistently similar to the perceived student achievement entry levels at the beginning of year 3 physics courses.

Table 6.30 represents perceived student achievement entry-exit data for the secondary school-college physics interface for a selection of topics widely taught across this interface. The first part of the table shows the average mean entry and exit levels as calculated for all the subtopics within these major headings and the second part, the mean entry-exit levels for the subtopic within each major heading that was most widely taught across the interface.

A number of factors may explain this perceived lack of student progress. First, there is a wide range of educational background on the part of students who enter college physics courses. Although most colleges prescribe year 3 Physics and a high school mathematics course as prerequisites for entry to technological and technician courses,

there are some indications that such requirements may be frequently waived on application to the Registrar. The mix of students who enter first year college physics courses, therefore, includes students who have year 3 advanced, year 3 general Physics, and students who have no secondary school physics courses. In the case of technology programs, a small percentage of students often have taken year 5 Physics. Whether the average student entry is actually as low as is perceived by college instructors could only be determined by objective student achievement tests given before entrance to college physics programs. The low perceived achievement level may be in part the result of a natural tendency for instructors to use the entire range of the rating scale in evaluating student achievement, a hypothesis that is supported by the fact that the perceived mean student college exit levels are quite high, especially for one-semester courses. They ranged consistently between the exit levels for year 3 advanced and year 5 Physics courses.

UNIVERSITY PHYSICS/PHYSIQUE YEAR 1

A. The Sample

1. *THE POPULATION OF COURSES*

All of the 10 universities which were included in this study offered a first year physics course designed for students intending to major in the physical sciences, usually in physics and/or in chemistry. One university offered two courses of this type; the difference was in the mathematical level of treatment. In some of the universities in the sample, engineering students were enrolled in the course for majors. In others, separate courses were mounted for engineers; those courses were not surveyed or sampled. All but one university offered a course for science students whose major was outside the physical sciences; these were typically biology majors. The one exception was a university which offered the same physics course both to the students majoring in a physical science and to those majoring in biology.

Four universities offered a course which was essentially a year 5 equivalent. In each case, this course was an alternative to year 5 Physics as a prerequisite for a major course.

Five universities offered a course which was classified as "basic". These were terminal courses for students who did not wish to continue in this science, but did want a physics course at the university level.

Finally, 5 universities offered additional first year physics courses whose content varied greatly from university to university; hence, they were classified as "special courses". All, however, were specifically designed for science students; none were of the "science requirement" type mentioned above. The subject matter of these courses is summarized as follows:

Course Type	No. of Courses
Astronomy	2
Physics of Music	1
Biophysics and Human Kinetics	4
Metric and SI Measurement	1
Electricity and Magnetism	1
Mechanics	1
Energy and Power	1

Two of the universities in the sample offered some of their physics courses in French as well as English. One of these universities offered 3 first year physique courses: one for students majoring in the physical sciences, one for students majoring in biology, etc., and a basic course for those without year 5 Physique. (This course, however, was not described as remedial.) The other university offered only one first year physique course for all science majors.

TABLE 6.31

UNIVERSITY PHYSICS/PHYSIQUE YEAR 1
COURSES IN THE SAMPLE

Nature of Course	Physics		Physique	
	Courses offered	Courses selected	Courses offered	Courses selected
Year 5 equivalent	4	1	0	0
Basic course (no prerequisite)	6	2	1	1
Minor (for biology majors, etc.)	10	6	1	1
Major (for physical science majors)	11	9	2	2
Special (astronomy, etc.)	11	0	0	0
Total	42	18	4	4

Personal interviews were conducted with all of the physics department heads in the ten universities in the sample. Those interviews confirmed the rationale for the organization of first year physics courses above.

There has been a trend over the past few years toward greater proportions of basic and year 5 equivalent courses being offered. The number of courses classified as 'special' in the previous section which were not required science courses and which covered a wide variety of topics from Astronomy to Energy and Power also appears to be on the increase.

Department heads were questioned about teaching methods in first year university physics. In some instances they indicated that audio-visual aids had been tried and discarded; in others, they were being used effectively, particularly in remedial work. There appears to be a greater emphasis than formerly on problem solving, and at least one institution made extensive use of the computer in this problem-solving process. The most important single departure from traditional patterns was utilization of a completely open laboratory assignment on a particular topic followed by a one-to-one tutorial session. Mastery of the topic, evidenced by a mark of 85 percent assigned during the tutorial, was required before the student could proceed to the next task. While the preparatory work for such a course was formidable, it had proven to be very effective.

Most chairmen felt that more time was spent on review than formerly, largely because of the variability among students in the topics covered at the secondary school level. One department dealt with this problem through use of taped lectures viewed in a tutorial room, staffed by a faculty member.

There has been very little change in the means of evaluating student performance in the physics departments studied. There is perhaps less emphasis on final examinations, with a correspondingly greater stress on term work. In common with those of most departments, the heads of physics departments acknowledged some erosion of standards in marking.

First year marks were considered fairly reliable, in the opinion of most, as an indicator of performance in later years. Some respondents were concerned about marks inflation.

2. NATURE OF COURSES SAMPLED

Nine of the 18 physics courses which were selected for the first year university physics analysis were drawn from those classified as "major". Six of the 10 "minor" courses and 2 of the "basic" courses were sampled also. One of the 4 year 5 equivalent courses rounded out the total of 18 courses sampled. None of the more esoteric "special" courses was included in the sample. (See Table 6.31)

All 4 of the first year university physique courses were sampled. Three were listed as the equivalent of the English-language course taught at the university. An analysis of the course content of 2 of these 3 courses indicated that the English and French versions of these courses essentially were the same. In the third instance, the physique instructor did not complete the questionnaire section dealing with course content. Only one independent physique course, therefore, was represented in the sample. The data from these 4 physique courses have been included in the descriptive analysis which follows, but because 3 of the courses either represented content identical to courses in the English sample or did not include content data, it was not deemed necessary to include them in the content analysis.

The courses which were selected for detailed analysis from the population of first year courses in the 10 universities represent a good sample of courses for physical science majors and for minors. Basic courses--those courses designed as terminal ones in physics for science students--also were represented adequately in the sample drawn for analysis. The courses which were classified as "other", that is, covering particular physics topics, were not sampled because of their very specific content. This decision was considered to be consistent with the purpose of the study. The extent to which students in engineering programs were represented in the courses analyzed was, unfortunately, not controlled, given that some were included in courses given to major students, while in other universities the engineering faculty offered their own physics courses, which tended to be more specifically geared to the needs of 'professional' students. These latter courses were placed in the same class as the 'other' courses and were not sampled.

B. Factors Influencing The Teaching Of The Course

1. BACKGROUND OF INSTRUCTORS

The physics instructors included in the sample had substantial university teaching experience: 95 percent had taught for more than 6 years - 39 percent, indeed, for over 16 years. However, 61 percent had taught the course they were presently teaching for 5 or fewer years. Another 22 percent had taught their present course for 6 to 10 years.

Eighty-nine percent of the instructors in the physics sample had Ph.D.s; the remainder held Master's degrees. The vast majority (88 percent) were either full or associate professors, as one would expect from their years of teaching experience. Twelve percent of the instructors had taught previously at a community college, but the great majority, 83 percent, had taught only at the university level.

2. PREREQUISITES AND COREQUISITES

Table 6.32 indicates the extent to which first year physics courses in the sample required a year 5 Physics prerequisite and a first year mathematics corequisite. Of the 'major' physics courses selected for analysis, 5 out of 9 specifically required year 5 Physics and 3 more recommended it. The situation is somewhat similar for the 6 'minor' physics courses: 2 required year 5 Physics and 2 more recommended it.

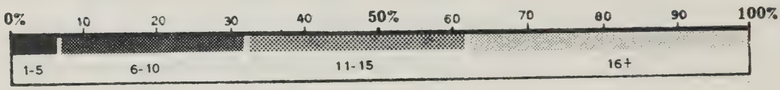
Three of the universities required students in both the 'major and the 'minor' physics courses to take a concurrent first year mathematics course (almost always a calculus course). These 6 courses were all in the group sampled. A surprisingly high number of major physics courses did not specifically require a concurrent mathematics course. It is quite possible, however, that in these universities a first year science program automatically includes a first year mathematics course and it is therefore not listed as a corequisite for the physics course.

Figure 13

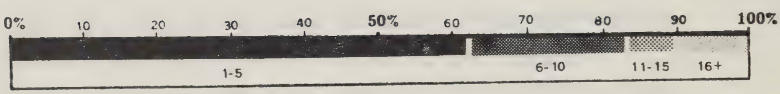
BACKGROUND OF INSTRUCTORS

UNIVERSITY PHYSICS YEAR 1
PERCENTAGE OF INSTRUCTORS IN EACH CATEGORY

Years Teaching at University



Years Teaching this or Equivalent Course



University Rank

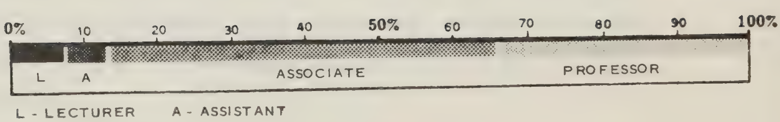


TABLE 6.32

UNIVERSITY PHYSICS YEAR 1
PREREQUISITES AND COREQUISITES

Course	No. sampled	No. with year 5 prerequisite	No. with first year university mathematics corequisite
Year 5 equivalent	1	-	-
Basic course	2(1)[a]	-	-
Minor (for biology majors)	6(1)	2[b]	3
Major (for physical science majors)	9(2)	5(2)	5
Special (astronomy, etc.)	0	0	0
Total	18(4)	7(2)	0

[a] Nos. for Physique courses given in parentheses

[b] 2 more recommend year 5 Physics

3. *QUALITY OF PREPARATION OF INCOMING STUDENTS*

(a) Preparation in General

The vast majority (84 percent) of university instructors of physics in the sample perceived a great deal of variation in the preparation of incoming students. The rest of the sample saw this variation as being only moderate. Perceptions of variability on the part of the physique instructors coincided with those of their English colleagues.

A very high percentage (86 percent) also saw the quality of preparation of incoming students as being only fair, and another 7 percent as poor; only 7 percent were prepared to rate it good. The physique instructors typically saw the quality of entering studnnts as being fair.

(b) Physics Preparation

From instructors' assessments of actual and preferred levels of student entry, it is possible to assess their satisfaction with the preparation of incoming students, along the lines developed for secondary school courses. Instructors were least satisfied with student entry achievement levels in the following topic areas: (see Table 6.33) Newton's Laws of Motion-Dynamics of a Particle (55 percent of instructors were dissatisfied), Measurement, Functions, Motion, Newton's Laws of Motion-Dynamics of a Rigid Body and Work, Energy and Power (on average, approximately half of the instructors were dissatisfied). Instructors were most satisfied with levels of achievement at entry in the topic areas, Atomic Structure, Nuclear Physics, Properties of Solids other than Thermal, Fluids at Rest and in Motion, the Special Theory of Relativity and Properties of Elementary Particles. The high level of satisfaction for these last six major headings coincides with low perceived student entry levels; it may well indicate low expectations on the part of university physics instructors. Those topics in which there was an average level of dissatisfaction of approximately 25 percent (Vibrations and Waves, Interference and Diffraction, How Light Behaves, and Temperature and Heat) are topics in which perceived entry levels and expectations are low.

TABLE 6.33

UNIVERSITY PHYSICS YEAR 1
% OF INSTRUCTORS PREFERRING A HIGHER LEVEL
OF STUDENT COMPETENCE AT ENTRY

	Major Topic	%[a] of Instructors Dissatisfied
1.	Measurement	50
2.	Functions	48
3.	Motion	45
4.	Newton's Laws of Motion-Dynamics of a Particle	55
5.	Statics	39
6.	Newton's Laws of Motion-Dynamics of a Rigid Body	50
7.	Gravity-Near the Earth's Surface	38
8.	Universal Gravitation	36
9.	Momentum	41
10.	Work, Energy and Power	46
11.	Vibrations and Waves	28
12.	How Light Behaves	15
13.	Interference and Diffraction	22
14.	Electricity and Magnetism	24
15.	Atomic Structure	13
16.	Nuclear Physics	8
17.	Temperature and Heat	23
18.	Properties of Solids other than Thermal	3
19.	Fluids at Rest and in Motion	11
20.	Special Theory of Relativity	11
21.	Properties of Elementary Particles	11

[a]To obtain the mean percentage, the percentage of instructors dissatisfied with each subtopic under the major heading was averaged.

TABLE 6.34

UNIVERSITY PHYSICS YEAR 1
MATHEMATICAL SKILLS

Skill	Skill not expected	Skill expected	
		Not achieved	Achieved
Ability to use concepts of ratio and proportion	0%[a]	29%	71%
Use of logarithms	12	47	41
Use of exponential functions	35	59	6
Ability to convert degrees to radians	24	29	47
Use of trigonometric functions	0	65	35
Use of trigonometric identities	29	42	29
Manipulation of linear equations	0	76	24
Ability to solve simultaneous linear equations	12	76	12
Ability to find the roots of quadratic equations	12	41	47
Ability to differentiate simple functions	41	41	18
Ability to integrate simple functions	59	35	6
Ability to manipulate vectors	24	70	6
Facility with vector algebra	47	53	0
Ability to apply the binomial expansion	59	35	6

[a]Percentage of instructors

They also represent topics in which the level of mathematical sophistication achieved in year 5 is perceived by the university instructors as being low.

(c) Mathematical Skills

In major topics #1-10, which include Measurement and Functions and the topics which go together to form the larger rubric, mechanics, the relatively high level of dissatisfaction with student achievement entry levels may well be due in part to the inability of students to handle the mathematical parameters of the topics. Competence in these major topic areas requires a facility with mathematical skills, particularly the manipulation of linear equations, the ability to manipulate vectors, and facility with vector algebra. Table 6.34 reveals the extent to which instructors found their students lacking in these areas. These and other important mathematical skills, although used in year 5 Physics courses, are not specifically taught there, and the extent to which they are mastered depends largely upon related year 5 mathematics courses. Formal prerequisites for first year university physics courses often did not include year 5 mathematics nor corequisite university mathematics courses.

Physics instructors expected incoming students to have facility in the first two of the three skills listed above, but over 70 percent of those who expected the skill did not consider that the student had achieved it.

Of the 14 skills listed in Table 6.34, more than 40 percent of instructors expected competence in 10, but only in 4 areas - use of logarithms and ability to use concepts of ratio and proportion, to convert degrees to radians and to find roots of quadratic equations - did more than 40 percent of those instructors believe that the students had mastered the skills.

4. OTHER FACTORS INFLUENCING THE TEACHING OF THE COURSE

Table 6.35 indicates university instructors' estimate of the extent to which 9 selected factors influenced their teaching. Far and away the most important category appears to be the knowledge of the subject among incoming students: 83 percent of instructors were greatly or moderately influenced by this - a figure which reinforces

TABLE 6.35

UNIVERSITY PHYSICS YEAR 1
FACTORS INFLUENCING THE TEACHING OF THE COURSE

Factors	% of Instructors Influenced				
	Not at all	To a small extent	To a moderate extent	To a great extent	N/A
Interests of students	11%[a]	39%	33%	17%	0%
Students' knowledge	6	11	50	33	0
Relationship to concurrent courses	6	22	66	6	
Information on students' future plans	12	18	35	29	6
Assigned course outline	28	0	50	11	11
Instructors' special interests of training	22	39	17	22	0
Principal text(s)	22	11	39	28	0
Staffing	44	0	6	12	38
Other	25	0	0	42	33

[a]Percentage of instructors in each category

N/A = Not applicable

instructors' assessments, reported earlier, of the highly variable preparation of incoming students. Given lesser but still significant weight were content and approach of principal texts and the relationship of the courses taught with other courses taken concurrently by their students, although the figures indicate that instructors varied greatly in the degree to which a principal text influenced their teaching. It is perhaps surprising that the special interests or training of the instructor had so little weight in the design or teaching of the course - for 61 percent of instructors, this factor possessed no or little weight.

C. Characteristics of the Course

1. *AIMS OF THE COURSE*

All the aims listed in Table 6.36 were at least mildly emphasized in the physics courses taught by the university instructors. Seventy-seven percent of the instructors placed at least moderate emphasis on students acquiring an attitude of scientific curiosity. By far the most influential aim, shared by 89 percent of university physics instructors (and important to those in college and secondary school as well) was the ability on the part of the student to think rationally and, in particular, to organize data presented in a problem and arrive at a solution. All instructors felt that the ability to evaluate in empirical terms reports of observed phenomena should be encouraged in physics courses, though 39 percent felt that only a little emphasis should be placed on it. The same percentage indicated that an understanding of the scientific method should be moderately emphasized; 50 percent maintained that it should be greatly emphasized. Among the various aspects of the scientific method, the ability to design and set up an experiment received the least amount of emphasis. Other aspects received considerably more attention - collecting and organizing data and interpreting and communicating the results.

TABLE 6.36

UNIVERSITY PHYSICS YEAR 1
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	No Emphasis	Very Little	Moderate	Great
1. The student should acquire an attitude of scientific curiosity.	0%[a]	22%	44%	33%
2. The student should be able to think rationally and in particular to be able to:				
a. organize data presented in a problem and arrive at a solution	0	11	0	89
b. evaluate in empirical terms reports of observed phenomena	0	39	28	33
3. The student should understand the scientific method	5	6	39	50
4. The student should be able to apply the scientific method to the study of the behavior of matter under the influence of the forces of nature and to the study of the properties of those forces including:				
a. the ability to design and set up an experiment	17	44	33	6
b. the ability to collect experimental data	5	17	28	50
c. the ability to organize and analyze experimental data	5	22	22	50
d. the ability to interpret the results of experiments in terms of mathematics and/or physical models	0	11	44	44
e. the ability to communicate the results of experiments concisely, critically and profitably with knowledge and understanding	6	17	39	39
5. The student should recognize technological and engineering activities as applications of the principles of physics and aim to understand these activities in such terms	0	39	39	22
6. The student should be aware of the historical development of ideas and concepts in physics and the evolving nature of its theories	6	50	39	5

[a]Percentage of instructors in each category

Although first year university physics students are asked to set up experiments, they are not required normally to design them. This probably accounts for the low emphasis attributed to this general aim. The last two aims, to recognize and understand technological and engineering activities, and to be aware of the historical development of ideas and concepts in physics, are more general in nature and as was the case in the secondary school physics courses, they received less emphasis.

2. *OBJECTIVES*

(a) Course Content

The degree of consistency of coverage of the subtopics in the 21 major physics topics taught across the first year university physics courses sampled was determined in the manner explained in detail in Physics Secondary School Objectives section. The results are presented in Table 6.37. In general, the university courses displayed only a moderate degree of consistency of coverage. For no major heading were all subtopics taught by more than 80 percent of the instructors; only two major headings were taught by fewer than 20 percent. A surprisingly large number of major headings was considered to have a low degree of consistency of coverage compared with the secondary schools; the majority of subtopics in these major headings were taught by about 50 percent of the instructors. Most of the major headings showed a moderate degree of consistency of coverage, i.e., some of their subtopics were taught by as many as 80 percent of the instructors and others by only 40 percent. As noted earlier, subject content of physique courses was not analyzed.

(b) Time Allocated To Major Content Headings

The 18 university physics courses sampled displayed a moderate degree of consistency in time allocated to the 21 major content headings (see Table 6.38). In particular, the first 10 major headings, which can be loosely classified as mechanics topics and which accounted for about 40 percent of the course time, displayed a relatively high degree of consistency of content coverage across the sample.

TABLE 6.37

UNIVERSITY PHYSICS YEAR 1
DEGREE OF CONSISTENCY OF COVERAGE

High Consistency		Moderate Consistency[a]	Low Consistency[b]
Covered by >81% of teachers	Covered by <20% of teachers		
Newton's Laws (Particles) (4 topics)	Properties of Solids	Measurement	Functions
Newton's Laws (Rigid Body) (1 topic)	Properties of elementary Particles	Motion	Universal Gravitation (3)
Universal Gravitation (2)		Statics	How Light Behaves
Momentum (4)		Newton's Laws (Rigid Body)	Interference and Diffraction
Work, Energy (4)		Gravity	Atomic Structure
		Momentum	Temperature and Heat
		Work, Energy, Power	
		Vibrations & Waves	
		Electricity and Magnetism	
		Nuclear Physics	
		Fluids at Rest	
		Special Theory	

[a] Coverage Scattered

[b] Many subtopics covered by 41-60% of teachers

TABLE 6.38

UNIVERSITY PHYSICS YEAR 1
TIME ALLOCATIONS

Major Topic	% of Total Course Time Allocated	
	$\bar{X}$	SD
1. Measurement	3.5%	2.3%
2. Functions	2.1	1.9
3. Motion	5.8	2.9
4. Newton's Laws-Particles	6.2	2.7
5. Statics	2.8	2.3
6. Newton's Laws-Rigid Body	5.2	4.0
7. Gravity-Near the Earth's Surface	2.6	1.7
8. Universal Gravitation	2.1	2.0
9. Momentum	5.0	3.1
10. Work, Energy and Power	7.8	4.7
11. Vibrations and Waves	5.8	3.8
12. How Light Behaves	4.2	4.4
13. Interference	4.3	3.8
14. Electricity and Magnetism	13.2	12.5
15. Atomic Structure	5.9	7.6
16. Nuclear Physics	4.5	7.1
17. Temperature and Heat	9.2	8.2
18. Properties of Solids	.4	.8
19. Fluids at Rest and In Motion	1.3	1.9
20. Special Theory of Relativity	1.9	4.1
21. Properties of Elementary Particles	.2	.4
22. Other Topics	2.5	7.4

The standard deviation from the mean was less than 5 percent for each of these 10 topics. Most of the remaining major headings which were taught to any extent displayed a much higher variability across the sample, especially Electricity and Magnetism, Atomic Structure, Nuclear Physics, and Temperature and Heat. The percentage of total course time devoted to these topics by at least a third of the instructors varied by more than 7 percent from the mean percentage time across the sample. Electricity and Magnetism, which received the largest fraction of the total course time (13 percent on average) also displayed the largest variability. The standard deviation from mean percentage time allocation for this topic was 12.5 percent.

In general, it would appear that the university instructors consistently are spending about 60 percent of the total course time on the first 13 major headings, loosely categorized as Mechanics and Optics and Waves. There is far less agreement, however, as to the allocation of time among the four major headings Electricity and Magnetism, Atomic Structure, Nuclear Physics, and Temperature and Heat, which account for about 33 percent of the course time.

(c) Student Achievement at Entry and Exit

Table 13.18 in Volume 2 presents a complete analysis of student achievement entry and exit levels as perceived by the first year university physics instructors of the courses sampled.

The most notable feature of these data is that perceived student achievement entry levels to first year university courses generally were lower than the entry level to year 5 as perceived by secondary school teachers for those subtopics taught at the year 5 level. The extent to which the subtopic was taught in year 5 across the province did not seem to be a factor in the perceived achievement entry level to university. In fact, if the subtopic was taught widely at both the year 3 advanced and the year 5 level, the entry level to university was perceived to be considerably lower than that for year 5, and often approximated the entry level to year 3 advanced Physics. If the subtopic was not taught widely at the year 3 advanced level, but only in year 5, the perceived student achievement entry level to first year university courses tended to be closer to, and in some instances higher than, entry levels to year 5.

Because the sample of first year university physics courses analyzed in this study included major and minor courses which did not have formally stated year 5 Physics prerequisites, entry and exit levels for the 7 university courses which did have clearly stated prerequisites were analyzed separately for a number of selected subtopics which were widely taught across the secondary school - university interface. There was no substantive difference in the perceived entry level to the selected mechanics subtopics between those 7 physics courses that had prerequisites and the total sample of first year university courses.

This could indicate either that de facto prerequisites were operating in the other major and minor courses that did not formally prescribe year 5 Physics as a prerequisite or, alternatively, that university instructors tended to base their perception of entry levels on the basis of their subjective impressions of students whom they typically encountered in their courses.

A second such analysis was carried out for the three university courses that specifically did not require year 5 Physics as a prerequisite. In these instances, perceived entry levels in the selected mechanics subtopics were substantially lower than for the total sample, ranging from 0.2 - 1.3 rating-scale units lower than was true for the total sample. The typical difference was 0.7 of a rating-scale unit. This would mean that the perceived achievement entry level to university courses in subtopics taught across the secondary school-university interface is artifically depressed approximately 0.1 of a rating-scale unit if one wishes to exclude from consideration university courses taught at a year 5 level. This small difference is not significant, given the substantive differences in perceived achievement entry-exit levels discussed above, but it does tend to support the hypothesis that there are de facto prerequisite requirements operating in those first year university major and minor physics courses which do not list year 5 Physics as a prerequisite. Students are not likely to enrol in such courses unless they do have year 5 Physics.

The possible reasons for the difference in perceived achievement levels of students leaving year 5 Physics and entering first year university physics courses, a difference which is also substantiated in the Project II study, will be dealt with in more detail in the discussion of the secondary school-university interface.

TABLE 6.39

UNIVERSITY PHYSICS YEAR 1
TEACHING METHODS

Method	% of instructors using for % Range of Time					
	0	1-10	11-20	21-30	31-40	41+
Lecture				22%	39%	39%
Socratic	44%[a]	50%	6			
Demonstrations	17	77	6			
Laboratory Work, experiments	17	6	27	6	33	11
Classroom Study	77	6	11	6		
Individualized Instruction	100					
Seminar, tutorial	60	6	17	11	6	
Small group activities	88	6	6			
Student presentations	100					
Testing	50	44	6			
Audiovisual	50	50				
Field trips, visits by resource personnel	100					
Other	94		6			

[a]Percentage of Instructors

3. METHODS OF INSTRUCTION

(a) Teaching Methods

As can be seen from Table 6.39, the lecture method was by far the most widely used method of instruction, averaging 47 percent of the total class time. Laboratory work, including experiments, occupied on average 25 percent of total class time. Responses, however, in this instance varied greatly. Seventeen percent of the instructors reported not using this method at all, while others reported that laboratory work consumed up to 55 percent of the total class time. The only other teaching method used to any substantial degree was the seminar/tutorial. Although, only 40 percent of instructors across the courses sampled used the method, for some instructors the table reveals that it was important. Those who indicated that seminars and tutorials were used on the average set aside 21 percent of class time. Classroom study fell into a similar category. It was not widely used across the sample, but when it was used it occupied an average of 21 percent of the total class time.

(b) Student Out-of-Class Work

University instructors were asked for an estimate of the amount of out-of-class time spent by the student on the physics course material. Thirty-five percent of the instructors responded that students spent from half an hour to an hour for every hour of class time allocated for the course. Twenty-four percent perceived this amount of "out-of-class" time to be more than one hour but less than one and one-half hours, while an additional 25 percent felt that more than one and one-half hours, and possibly as much as two hours, were spent out-of-class on physics for every hour of class time.

(c) Provision for Individual Progress

The figures here were comparable to those for secondary school and college: 88 percent responded that their physics courses were structured in such a way as to prohibit individuals from progressing at different rates through the course material; the remaining 12 percent reported that this was possible only to a small extent.

TABLE 6.40

UNIVERSITY PHYSICS YEAR 1
TEACHING RESOURCES

Resource	Use by % of Instructors				
	Not at all	A little	To a Moderate extent	To a Great extent	Not Applicable
Main text	0% [a]	0%	22%	78%	0%
Main text plus supplementary texts	17	28	33	0	22
Two or more main texts or materials from other texts	44	25	6	0	25
Laboratory equipment	6	5	17	66	6
Mimeographed materials (notes, etc.)	44	33	11	6	6
Reference books, dictionaries, encyclopedias, journals, etc.	55	39	6	0	0
Individualized learning packages	78	11	0	0	11
Audiovisual media	33	50	6	0	11
Other	67	0	5	28	0

[a]Percentage of Instructors

(d) Amount of Time Spent in Review

Seventeen percent of the instructors did not set aside any class time for review. Fifty-five percent reported setting aside up to 10 percent of total class/laboratory time for this purpose, 11 percent reported that between 10 and 20 percent was set aside, and 17 percent claimed that more than 20 percent of class time was spent in review of topics taught in secondary school.

(e) Teaching Resources

Table 6.40 illustrates the use of teaching resources by the instructors of the university physics courses sampled. A main text was the most important teaching resource: 78 percent of the instructors used it to a great extent, the remaining 22 percent to a moderate extent. Thirty-three percent of the instructors used a main text, along with supplementary texts, to a moderate extent. Laboratory equipment was the only other teaching resource used extensively by the university instructors: 66 percent of those sampled used it greatly; an additional 17 percent claimed to make moderate use of this resource. All the other listed resources were used sparingly.

4. ASSESSMENT OF STUDENT WORK

(a) Final Mark Allocations

There were no cases in which students could be exempted from the final examinations in the first year university physics courses surveyed. Final examinations accounted for an average of 42 percent of the final mark. Mid-term and other written examinations accounted, on an average, for another 27 percent of the final mark. The standard deviations in the case of written exams, of all types, however, were quite large, ranging from 13 to 15. Only three other methods, problems and exercises, laboratory reports, and laboratory and/or classroom participation were used to any extent in determining the final mark in the university physics courses, and standard deviations in these instances again were substantial. Clearly, there are some differences of approach to the assessment of student work, but the picture presented is both more traditional and simpler than is the case for either secondary school or college.

TABLE 6.41

UNIVERSITY PHYSICS YEAR 1

FINAL MARK ALLOCATION AND COURSE TIME ALLOCATION COMPARED

	Major Topic	$\bar{X}$ Mark (%)[a]	$\bar{X}$ Time (%) (from Table 8)
1.	Measurement	0	3.5
2.	Functions	0	2.1
3.	Motion	3	5.8
4.	Newton's Laws-Particles	7	6.2
5.	Statics	6	2.8
6.	Newton's Laws-Rigid Body	8	5.2
7.	Gravity	0	2.6
8.	Universal gravitation	1	2.1
9.	Momentum	8	5.0
10.	Work, Energy and Power	6	7.8
11.	Vibrations and Waves	14	5.8
12.	How Light Behaves	6	4.2
13.	Interference and Diffraction	5	4.3
14.	Electricity and Magnetism	14	13.2
15.	Atomic Structure	5	5.9
16.	Nuclear Physics	6	4.5
17.	Temperature and Heat	5	9.2
18.	Properties of Solids	2	0.4
19.	Fluids	4	1.3
20.	Special Theory of Relativity	0	1.9
21.	Elementary Particles	0	0.2
	Total	100%	100%

[a]For a subsample of 5 course examinations.

(b) Analysis of Sample Current Examinations

Of the 10 Universities sampled, only 3 sent copies of final examination papers in courses which were selected for this study. As a result, examination papers were analyzed for only 5 courses - 2 major courses and 3 minor courses.

An analysis of the content coverage of these 5 final examinations indicated that the physics course content matrix which was developed for use in this study covered the vast majority of subtopics examined in the university courses which submitted final 1976 papers. The only topics that appeared in these examinations and that were missing from the matrix were Polarization of Light, the Definition of Force and the Heisenberg Uncertainty Principle.

A mean mark allocation for the five courses was calculated for each major content heading, and these average mark allocations were compared to the mean percentage time allocated to each major topic presented in Table 6.38. These data are presented in Table 6.41

Although the 5 final examinations analyzed may not be representative of the total sample, there was fairly good agreement between the average mark allocation to a major heading and the mean percentage time devoted to that topic by the total sample. The only outstanding exception occurred in the heading, Vibrations and Waves. The average mark allocated for this topic was 14 percent, although only approximately 6 percent of the total course time was spent on this topic. The style of the four examinations studied also was fairly uniform. Almost all questions were of the problem type; occasionally a question asked for a short one-or two-sentence explanation or definition.

D. Discussion

The data gathered regarding the qualifications, academic rank and experience of the persons who teach first year university physics indicate that university physics departments are committing some of their most qualified and experienced faculty to this task. These persons have taught this course long enough to know the capabilities of incoming students well and their judgements in this regard should be sound. Among the factors influencing their teaching of first year physics, the knowledge of incoming students and the relationship of the physics course to the rest of their program were rated as being very important. Because the variability of knowledge of incoming students was perceived as being so high, and because the courses surveyed represented two distinct types of courses, those for 'majors' and those for 'minors', first year physics courses displayed only a moderate degree of consistency of content coverage. This degree of content consistency, based on the percentage of instructors teaching each subtopic in the physics content matrix was rated as being only moderate in the rating scale scheme devised for use in this study. The mean percentage of time devoted by first year university instructors to the major topics, Measurement and Functions, and mechanics, indicated a somewhat higher level of consistency of coverage across the university courses.

First year university physics instructors exhibited the highest level of dissatisfaction with incoming students of any of the instructors at the two levels in the study of this discipline. This was notable when university instructors rated the level of achievement of students in general, when they were asked whether they would prefer a higher level of achievement on entry to each specific subtopic in the matrix, and more specifically when they rated certain mathematical skills essential to the learning of physics.

The perceptions of low student entry achievement level for each of the subtopics in the matrix were another indication of their dissatisfaction; they will be related to the year 5 results and discussed at some length in the secondary school-university interface analysis.

THE SECONDARY SCHOOL YEAR 3 - COLLEGE YEAR 1 INTERFACE

The interface between the secondary schools and colleges in the teaching of physics is far from being solely the interface between year 3 general Physics and first year college courses. While this course provides a large group of students from which the first year college pool is drawn it is not the only source. That this group alone would provide wide variability of student preparation is evidenced by the fact that it has the lowest consistency of any of the secondary school physics courses sampled. When, however, other courses add their contribution to the student stream, the range of achievement is widened still further. The other courses consist of year 3 advanced Physics, other year 3 courses such as Man and Space, and Man, Science and Technology and to a limited extent year 5 Physics. To complicate matters still further many students enrol in college physics courses with no background in the subject at all.

The situation on the other side of the interface is even more heterogeneous. Of the 4 categories of courses discussed earlier in section A, 2 of them were "catchalls" (multi-topic and 'other'). Even the 2 categories which could be precisely named (Mechanics and Electricity) embraced some quite diverse courses. It would be difficult to find 2 courses among the first year physics courses in the 15 colleges which are identical in content, emphasis and balance between theoretical and practical. The ill-defined nature of the interface is evidenced by the following:

(1) College physics instructors rated the average student achievement level at entry to their courses as being essentially the same as student achievement entry level to year 3 Physics courses as perceived by secondary school teachers (see Table 6.40).

(2) College instructors typically devote considerably more time to review than do either high school or university teachers.

The interface is accommodating in that colleges accept students with a wide range of general and specific secondary school backgrounds. It is inefficient in that it appears as if much of the material which is taught in year 3 is taught again in first year college physics courses.

The extent to which this interface could be changed to represent a better match presents both philosophical and practical problems. The philosophical aspects of restricting admission to college programs to students who have taken and passed specific courses are beyond the scope of this discussion. Whether such a procedure would produce a better interface, given the wide variety and number of first year physics courses offered across the province, is a moot question. Certainly, the preparation of updated curriculum guides for both year 3 Physics courses on the basis of joint consultation between secondary school and college instructors, would be a first step in the improvement of the interface. An agreed core curriculum for year 3 Physics courses would lead to increased consistency in the coverage of appropriate topics in high school and a correspondingly higher level of student achievement in these core topics on entry to college physics courses. Exclusion from college physics courses of students who did not take year 3 Physics courses probably is not acceptable. An alternative is to screen students on the basis of their formal prerequisites and/or demonstrated mastery of subject matter and then to offer remedial work to those who do not meet the standards.

THE SECONDARY SCHOOL YEAR 5 - UNIVERSITY YEAR 1 INTERFACE

The university-secondary school physics interface is one of contradiction. On the one hand, in year 5 the picture can be described as one of relatively high order and satisfaction. Despite the fact that it has been ten years since the last Ministry of Education curriculum guideline was issued for year 5 and that P.S.S.C., an American curriculum guide, seems to be used at least to some extent in year 5 Physics courses, there is a relatively high level of consistency of content coverage across the schools sampled. This is confirmed by the analysis of the percentage of teachers who teach individual subheadings in each of the 21 major headings and also by the consistency in the amount of time allocated to the 21 major topic headings as indicated by questionnaire responses. This time allocation also conforms quite closely to that prescribed in the Ministry of Education guideline. Another fact that contributes to the relatively high consistency of topic coverage in secondary school year 5 Physics is that a single text was widely used across the schools sampled.

There is a relatively high level of satisfaction with incoming students on the part of year 5 physics teachers, expressed in general terms and in specific analysis of entry levels: the percentage of teachers who expressed dissatisfaction with levels of incoming students was relatively low. The year 5 teachers also appear to be reasonably happy about the level of student achievement in the mathematical skills which they see as being essential in dealing with the physics content in their courses. In addition, there is an orderly perceived student entry and exit achievement pattern between the year 3 advanced course and the year 5 course. The perceived student achievement entry level to year 5 Physics typically lies between the entry and exit level for year 3 advanced.

The exit level as perceived by year 5 teachers from their course is consistently higher than the corresponding exit level from year 3 advanced courses. Some reservation should be noted about this orderly satisfaction and entry and exit level consistency. Physics departments in secondary schools in Ontario typically are small and in many instances, teachers are engaged in the teaching of both year 3 and year 5 Physics. In instances where this is not the case, the year 5 teacher is in constant communication with the year 3 teacher and this factor probably contributes to a fairly high congruence of minds on such issues as entry and exit levels and satisfaction with the achievement level of students.

On the other hand, the first year university physics instructors expressed a relatively high level of dissatisfaction with the student entry achievement level to their courses. This was true particularly for content topics that were widely taught across the secondary schools at both the year 3 and year 5 levels. Almost half the university instructors typically expressed dissatisfaction with the entry achievement level in each of the first 10 major topics of the matrix, representing Measurement and Functions and the topics which go together to make up mechanics. The material within these topics was in general taught widely at both the year 5 and year 3 levels in the secondary schools sampled. For the rest of the major topics, which were not taught to any extent in year 3 and were taught with less frequency across the year 5 courses sampled, approximately 25 percent of the university instructors expressed dissatisfaction with the levels of student achievement at entry. The same pattern was confirmed in the analysis of the university instructors' perceptions of student achievement at entry to their courses, as expressed for each specific subtopic in the matrix. For subtopics in the major headings, Measurement and Functions, and for those which go together to make up mechanics, the perceived student achievement entry level consistently fell below the student achievement entry level of year 5 Physics courses as perceived by the secondary school teachers. For other topics in the matrix, the university physics instructors' perception of student achievement entry level generally coincided and in some instances, was higher than the student achievement entry level to year 5 courses.

In this latter instance, as would be expected, it was a lowering of the perceived entry level to year 5 Physics that accounted for the better fit of entry levels between year 5 and first year university courses. This tends to confirm the hypothesis advanced in the discussion of secondary school data that secondary school physics teachers were apt to use the entire range of the rating scale in evaluating student achievement at the year 3 and year 5 level, regardless of the level of mathematical sophistication at which the topic was covered in year 5. The topic areas in which there were relatively high levels of dissatisfaction and in which student entry level was perceived as being lower than that for year 5 Physics also coincided with topics which require those mathematical skills in which the university physics professors reported the highest level of incompetence on the part of incoming students-in particular skills that were essential to dealing with the mechanics aspect of the university curriculum. The only issue on which there appeared to be a common ground between year 5 Physics and the university teachers was that both agreed that there was a high level of variability of student achievement upon entry to their courses.

In summary, then, when the university physics instructors' expectations are highest, that is in topics which they perceive correctly as being widely taught in the secondary schools, their satisfaction with the student achievement level at entry tends to be lowest and the discrepancy between achievement levels perceived by high school teachers and university instructors tends to be greatest. The extent to which perceived incompetence in mathematical skills is a factor in this dissatisfaction is difficult to estimate. That it is a factor is confirmed by the estimates of achievement levels reported above.

The discrepancy between the student achievement entry level to university as perceived by university instructors and the student year 5 exit level as perceived by the high school teachers is crucial in any analysis of the secondary school-university interface.

The extent to which the university physics professors' perceptions reflect the actual achievement level of incoming students can only be confirmed by the objective testing data which will be forthcoming from the Interface II project. At least part of this discrepancy may be explained by the variability in quality of preparation of incoming students. Almost 89 percent of the university instructors indicated that there was a great deal of variability in the quality of preparation of incoming students. They also rated the knowledge of entering students as the factor which had the greatest influence on the physics courses which they taught. It is probable that a high degree of variability in entering students' competences tends to contribute to a situation where the university instructors assume that the incoming students have less knowledge than is actually the case and that the level at which they commence teaching a given topic tends to fall below the mean achievement level of students entering the course.

This high degree of variability of achievement on the part of incoming students cannot be attributed to a high degree of variability of course content across the year 5 Physics courses sampled. The year 5 Physics courses were rated as having the highest level of consistency of content across the sample in comparison to all the other courses analyzed at each of the 3 institutional levels. This high level of agreement in the content covered in year 5 Physics was established by specific analysis of the percentage of instructors who reported having covered specific subtopics within each major heading and was substantiated by analyses both of the percentage of time which year 5 Physics teachers devoted to each of the major headings and the extent to which topic and time allocations conformed to Ministry guideline recommendations.

There appears to be no philosophical objection to a more effective interface between year 5 and university physics because the students who are taking year 5 Physics, for the most part, are students with specific post-secondary professional aspirations who anticipate that they will be taking first year physics at university. The incidence of students taking major or minor courses at university in first year without appropriate year 5 Physics reouirements appears to be low.

An analysis of the perceived student achievement level between major and minor courses indicates that there is a de facto prerequisite requirement in these courses in most universities. There is not, therefore, in physics, as is the case in other subjects, the problem of the university having to accommodate, in first year courses, a substantial number of students who wish to study the discipline without appropriate high school preparation. It probably would be useful, however, if the universities were more specific about defining the prerequisites for major and minor physics courses in the universities.

There appear to be a number of steps which could be taken to improve the university-secondary school interface in physics. First, it is obvious that there is a need to develop a new updated curriculum guideline in year 5 Physics. The first issue to be resolved is the nature of the core body of knowledge required for the year 5 Physics course. This may not be as easily resolved as one might think, because there was a fair level of variance in the content coverage of university physics courses sampled in the study. It is obvious that the year 5 Physics course could not assure some level of competence on the part of year 5 students for all the topics which were covered in the first year university physics courses sampled in this study. There seems, moreover, to be some resentment in the secondary schools about the fact that the Ministry of Education has not made any steps to update the curriculum guideline in year 5 Physics since 1966. Some department heads interviewed indicated that they felt the Ministry had abdicated its responsibilities in this regard.

Second, it appears that the present year 5 curriculum guideline covers too much ground to ensure the level of competency which the universities would like. Although the year 5 teachers appear to cover the great majority of the content as outlined in the Ministry of Education guideline, it is conceded that many of these topics are not covered at the depth desirable for entry to a university physics course. There is a need, therefore, for a narrowing of the core content in year 5 Physics, and for a more specifically agreed-upon definition of the level of difficulty at which the year 5 teachers should cover the topics in the core.

Third, the mathematical skills which are necessary for students to master the physics content in year 5 and first year university physics constitute an area of ambiguity. Although there appears to be a fairly high degree of agreement as to what mathematical skills are necessary, these skills need to be defined carefully by appropriate university and secondary school personnel. The matter of exactly where and how the physics student is to acquire these necessary mathematical skills also needs to be resolved. The year 5 Physics teachers indicated that they did not specifically teach these skills except in so far as it was necessary to solve particular problems in their course. Coordination, therefore, is needed between physics and mathematics in the secondary schools to ensure that students who are taking physics do get the appropriate mathematical training.

Fourth, there needs to be more and better communication as to what is being taught at the secondary school level and there is a great need for a more accurate identification of the level of achievement of typical students entering first year physics courses. There appears to be a tendency for university professors to assume a low level of achievement on the part of entering students when in fact the objective tests conducted by Project II indicate in some instances, that students do have a reasonable level of competency. The natural tendency to look to the low quarter of the entering students to identify the appropriate level of achievement probably means that in some instances, the average level of achievement in first year university Physics courses is being underestimated by the university instructors.

7 Mathematics and Mathématiques

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A. The Sample

The normal mathematics courses that can be taken in year 4 for a student proceeding to a college are year 4 general and year 4 advanced. These courses were chosen as the appropriate courses at the secondary school side of this interface. Similarly, the three year 5 courses: Relations and Functions, Calculus and Algebra were chosen as the population for the study of the secondary school/university interface. Since Probability and Statistics was deemed an important area, it was included in the courses studied at university, although as an experimental secondary school course its status is unclear and it was not designated as a course to be sampled at secondary level.

1. *EVOLUTION OF THE PRESENT YEAR 4 AND YEAR 5 COURSES*

The present year 4 and year 5 mathematics courses became operative in 1972.[1] They represent a further modification in the major revisions of all mathematics courses in Ontario for grades K-13 that began with the formation of the Ontario Mathematics Commission in 1960. This body, which had on it representatives from all levels of schooling including universities (and, from 1967, colleges) and from the Ministry of Education, has played an outstanding role in the updating of the Ontario school mathematics curriculum.

The initial revisions in year 4 and 5 in Ontario were the result of a recognition of the tremendous advances made in mathematical knowledge and thinking in the period 1850-1950. Vast new areas of mathematics had been developed, necessitating a reform of undergraduate mathematics programs in the 1950s and early 1960s; this had a consequent impact on the secondary schools. The two new year 5 courses (Algebra and Analysis) which were instituted in 1966 were designed to replace 3 individual credit courses (Geometry, Algebra and Trigonometry).

[1] Mathematics, Senior Division-guidelines N(72-1032)

They did, however, pose administrative problems because they required 7 or 8 periods a week. In addition, the general trend to individual progress, flexibility and the credit system, and the work of various study committees of the Ontario Mathematics Commission, combined to encourage the replacement of these two courses by the three courses Relations and Functions, Calculus, and Algebra. These new courses were designed to be more flexible; each course stipulated a core of basic topics together with a selection of optional sections grouped as supplementary and enriched.

These three courses constitute the major mathematic offerings in year 5 although there is a fourth course, the Mathematics of Investment, oriented to the study of business and commercial applications of mathematics, taken only by a low percentage of students.

At the year 4 level, similar revisions of the courses originally introduced in the mid 60s occurred, and the courses were redesignated as Applications and Foundation courses in 1972. They are now often described as year 4 general and year 4 advanced.

The Ministry of Education has also recently instituted a policy whereby experimental courses may be offered. The procedure is for a school to make a proposal, and submit it for approval to the Ministry's office in that region. Courses of an accelerated or remedial nature as well as courses in specialized subject areas, such as Statistics, may then be approved.

2. *THE NATURE OF THE SAMPLE*

There were no problems in classifying courses for analytical purposes. Of 53 schools sampled (about 8 percent of the total number of secondary schools in the province) returns for the 5 individual courses ranged from 49 to 51, thus averaging well over 90 percent. Failure to return was due in almost all cases to absences of teachers. Subsequent analysis of the 53 school calendars revealed further information about total course offerings in year 4 and 5. Thus, 34 of the 53 schools offered other mathematics courses in year 4, mainly Computer Science, Business and Technical Mathematics, while only 16 offered additional year 5 courses, mainly Mathematics of Investment (8) and Statistics (3) (see Table 7.1).

TABLE 7.1

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES
YEAR 4 AND YEAR 5 COURSES IN THE SAMPLE

Nature of Course	Year 4 Courses Offered	Year 4 Courses Selected	Year 4 Responded		Year 5 Courses Offered[b]	Year 5 Courses Selected	Year 5 Responded
			Mathematics				
General	50[a]	50	50	Calculus	52	51	51
Advanced	60[a]	52	49	Algebra	52	51	50
Computing	23			Relations & Functions	52	51	49
Business Mathematics	13			Investment	8		
Other	15			Statistics	3		
Total	161	102	99	Other	5		
				Total	172	153	150
			Mathématiques				
General	13[c]	13	13	Calculus	14	14	12
Advanced	14	14	14	Algebra	13[e]	13	11
Computing	7			Relations & Functions	14	14	13
Business Mathematics	4			Investment	4		
Other	5[d]			Total	45	41	36
Total	43	27	27				

[a] 3 secondary schools did not offer year 4 general; 1 secondary school did not offer year 4 advanced

[b] 1 secondary school did not offer any year 5 courses

[c] one school did not offer a year 4 general mathematics course

[d] "enriched"

[e] 1 school did not offer year 5 algebra

According to data from a subsample of 14 department heads interviewed, many of these schools were also attempting to adapt their course offerings to accommodate the trend toward greater freedom of choice, and variations in student competence: three schools offered a remedial course in year 1 in addition to the regular year 4 and 5 offerings. One school offered its own general mathematics course in years 3/4, a second had a year 3 'basic' mathematics course, and a third offered an optional Mathematics of Investment course in year 4. In year 5, one innovation was an experimental Applied Mathematics course for the more practically oriented student. This course is apparently accepted as a nonmathematics year 5 credit by the universities to which the graduates of the course have gone.

B. Factors Influencing the Teaching of the Course

1. *BACKGROUND OF THE TEACHERS*

The relevant data are summarized in the bar graphs. It is clear that in general the experience and qualification of teachers in mathematics and mathématiques are very similar. There are, however, some slight differences and these can be seen in Figures 14 to 17.

Year 4

About 40 percent of those teaching year 4 general had 11 or more years secondary school experience as opposed to 27 percent in the case of those teaching year 4 advanced; 30 percent of teachers for year 4 general and 36 percent for year 4 advanced had 5 years or less secondary school experience. Between 70 percent and 80 percent of those teaching these two courses have been doing so for 5 years or less, while the percentages of teachers teaching in their area of specialization were very high - 72 percent for year 4 general and 92 percent for year 4 advanced (Figure 14). The great majority of these teachers (72 percent for each of the two courses) had not taught at any other institutional level, while 14 percent in each case had done so at elementary school level.

Figure 14
BACKGROUND OF TEACHERS

SECONDARY SCHOOL MATHEMATICS YEAR 4
PERCENTAGE OF TEACHERS IN EACH CATEGORY

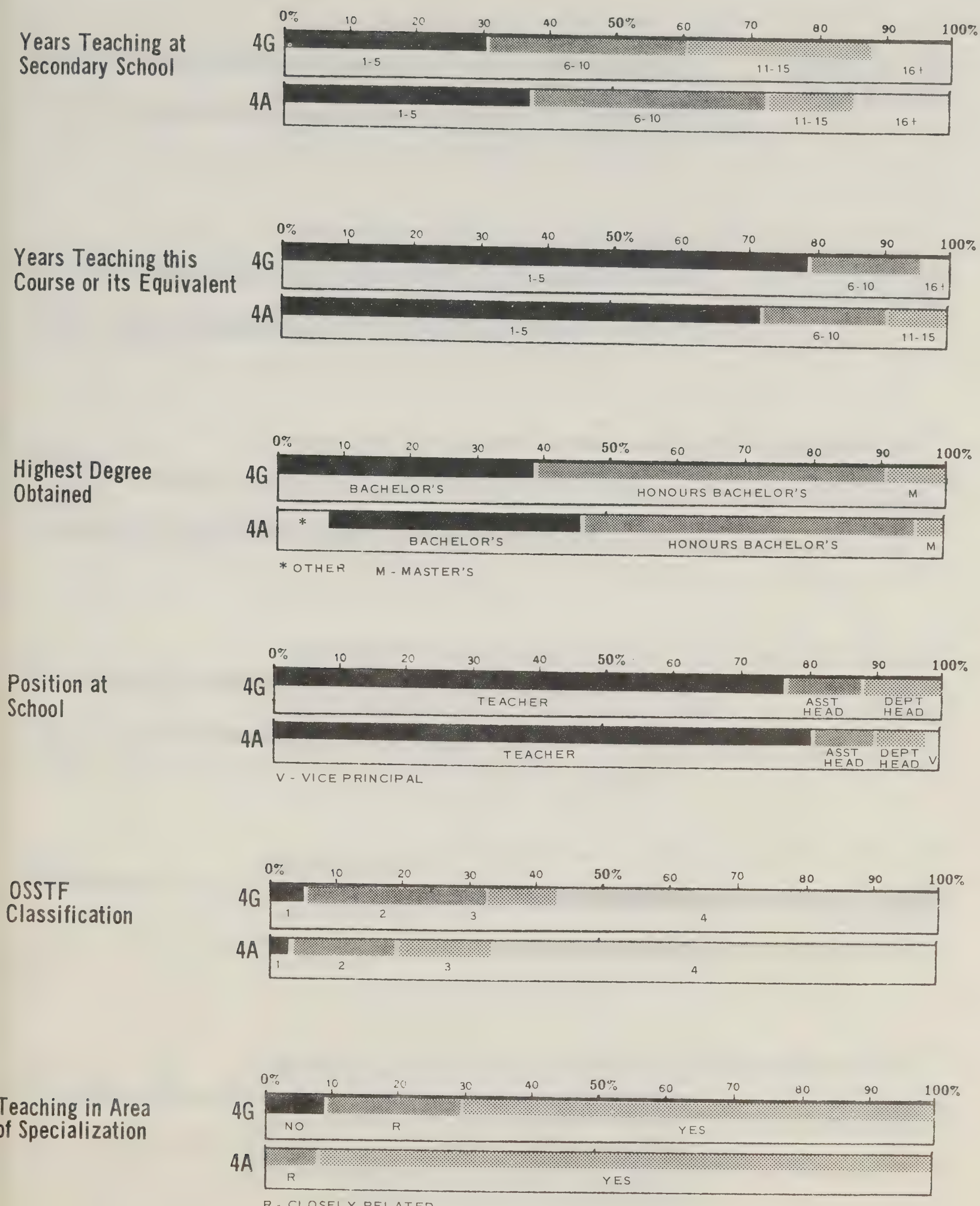


Figure 15

BACKGROUND OF TEACHERS

SECONDARY SCHOOL MATHEMATIQUES YEAR 4
PERCENTAGE OF TEACHERS IN EACH CATEGORY

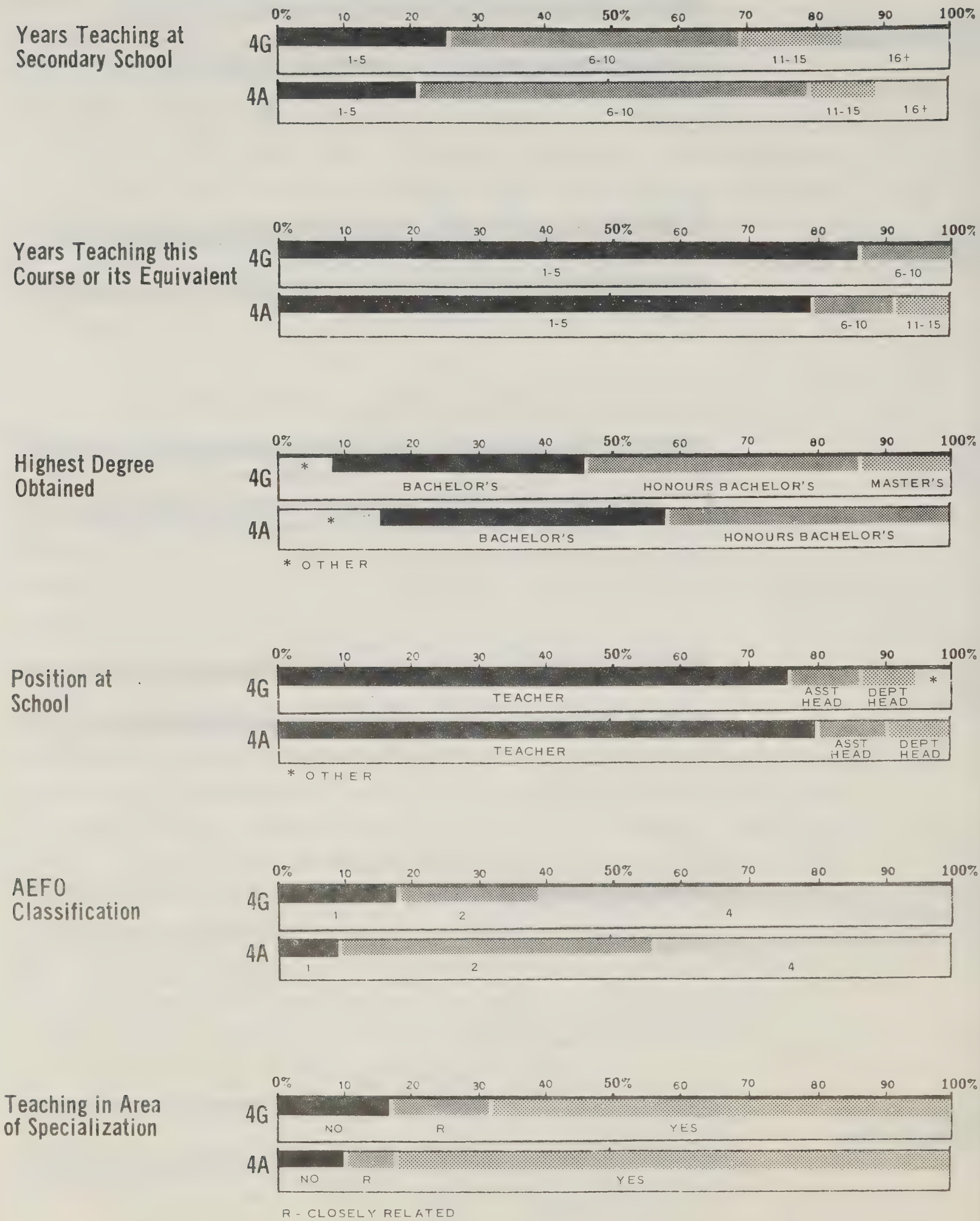


Figure 16

BACKGROUND OF TEACHERS
SECONDARY SCHOOL MATHEMATICS YEAR 5
PERCENTAGE OF TEACHERS IN EACH CATEGORY

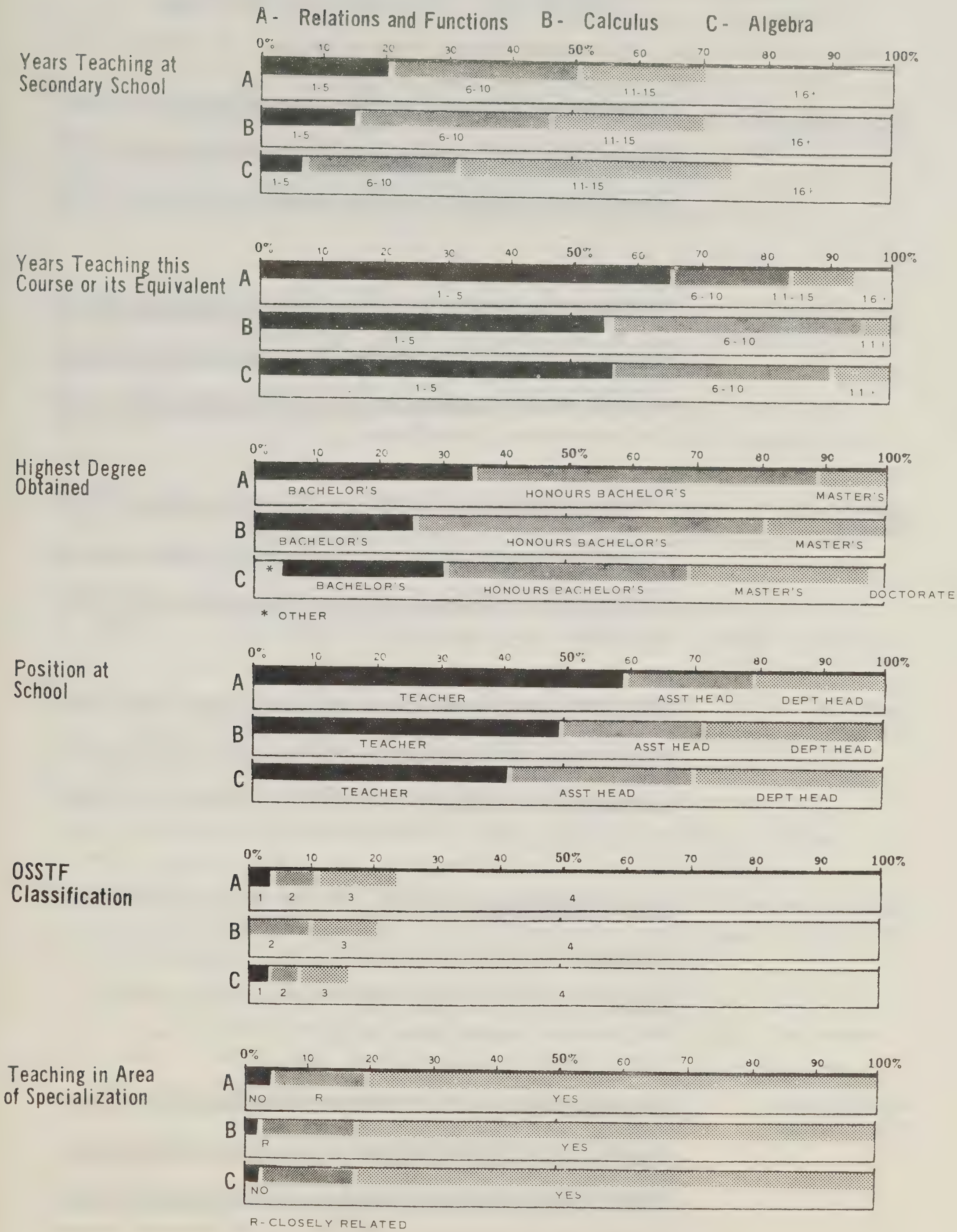
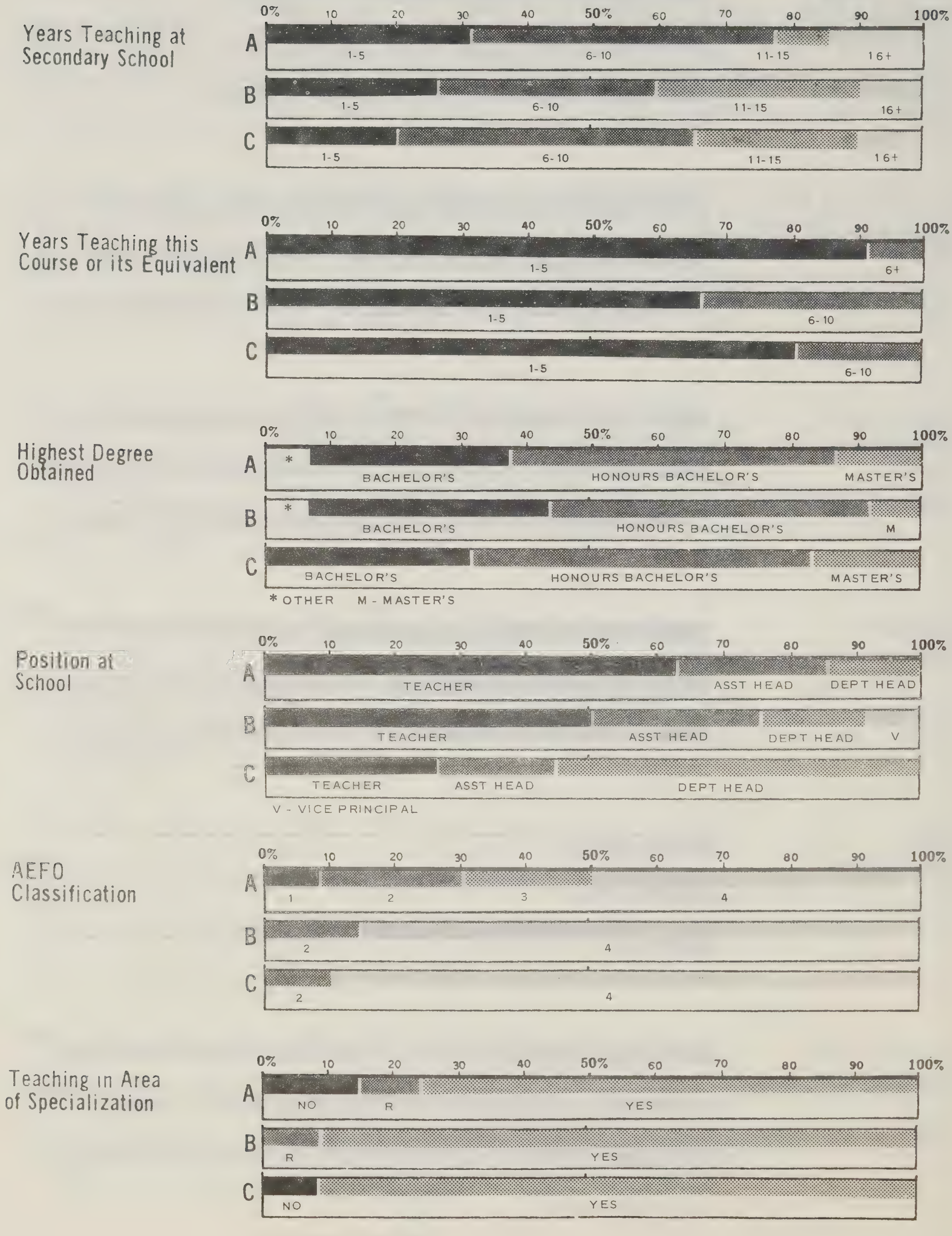


Figure 17

BACKGROUND OF TEACHERS

SECONDARY SCHOOL MATHEMATIQUES YEAR 5
PERCENTAGE OF TEACHERS IN EACH CATEGORY

A - Relations and Functions B - Calculus C - Algebra



The academic qualifications of both groups were similar, about 90 percent having a B.A. or Honours B.A. The remainder had mainly Master's degrees. A little over 20 percent (year 4 general) and a little under 20 percent (year 4 advanced) held an administrative position, half as department head, half as assistant department head. Over 60 percent held category 4 OSSTF/AEFO Certification. Practically all had at least category 2. The year 4 advanced teachers had higher levels of certification than the year 4 general, when compared over all four categories.

Year 5

Between 48 percent and 56 percent of year 5 teachers had over 10 years secondary school experience. Over 90 percent had at least 3 years experience. Those teaching Algebra were the most experienced overall. Significant percentages of teachers had been teaching these courses for quite some time, though figures varied: percentages of those teaching the course for 6 or more years ranged from 36 percent in Relations and Functions to 46 percent in Calculus. However, 20 percent and 40 percent had only been teaching their particular course for 1 or 2 years. Just over 80 percent of the teachers in all 3 courses were teaching in their area of specialization, with almost all the remainder teaching in an area related to it. Roughly 75 percent of the teachers had no experience at other levels, elementary, college and university, and a few (2 to 4 percent) at more than one level.

Year 5 teachers were better qualified in general than their year 4 counterparts. All held degrees, and 65 to 70 percent possessed an Honours Bachelor's or higher degree. Between 12 and 30 percent held Master's degrees, and 1 teacher teaching year 5 Algebra had a Doctorate. Between 40 and 60 percent were either department heads or assistant department heads, about equally divided. Category 4 OSSTF/AEFO certification was held by between 78 percent and 86 percent, with decreasing percentages in the lower certification categories.

These statistics indicate that in general, the year 4 and year 5 teachers in the sample were both experienced and well qualified. The amount of variation seems "normal" and no unusual features likely to produce poor teaching seem to be present.

2. *PREREQUISITES OF THE COURSE*

Prerequisites for year 4 and year 5 courses were required by about 90 percent of the schools sampled on the average. Year 5 levels were slightly higher, especially for Calculus, which was 96.1 percent for mathematics and 100 percent for mathématiques courses.

The condition required most often was successful completion of the course of the previous year at the same difficulty level. In year 4 this condition was used by 32 to 43 percent of mathematics and by 78 to 92 percent of mathématiques courses. In a small percentage of mathematics courses, only the stronger condition of more than one course at the same difficulty level was employed. Other weaker conditions such as a teacher's recommendation were used to a fairly minor degree.

3. *CHARACTERISTICS OF INCOMING STUDENTS*

Data on this were available from two sources: the questionnaire, and the answers given by department heads in the interview.

Year 4

Variation in incoming competencies was perceived to be "a great deal" by over 50 percent of those responding, with only 7 percent believing it to be "very little". Mathématiques' teachers perceived somewhat less variation in students - 45 percent viewed it as "moderate". Skills were seen as the most variable ingredient by 74 percent of those responding, but knowledge and attitudes were judged most variable by between 30 percent and 50 percent.

When asked to indicate areas in which students were well prepared or should have been better prepared the same general responses occurred, with greater concern again shown for skills. Year 4 advanced mathématiques teachers were apparently satisfied with knowledge preparation (82 percent) but not with skills (only 18 percent). Concern about knowledge preparation was moderate in mathematics courses.

This general information can be substantiated using data from the questionnaire item asking teachers to rate both actual and preferred levels of student competence at entry to and at exit from the course for relevant items among the 145 specific mathematics topics provided (see Table 7.2).

An index of dissatisfaction with entry level was defined as a difference of 1 scale point or over between actual entry and desired entry level of student competence in individual topics. For each topic, the percentages of teachers "dissatisfied" with student competence were grouped into ranges and the number of topics for each percentage range was counted for each major content area. Thus, for example in the topic area, Basic Algebra, between 40 and 60 percent of the year 4 general mathematics teachers were dissatisfied with incoming competence in 5 of 22 topics. The degree of dissatisfaction is greatest in the areas of Basic arithmetic, Basic algebra, Quadratic functions and equations, Exponential and logarithmic functions, and Trigonometry and allied topics. Yet the degree of overall dissatisfaction is not excessive, since cumulatively for all 145 topics, the number of topics for which more than 20 percent of the year 4 mathematics/mathématiques teachers are dissatisfied varies between 15 and 52. There is greater and more variable dissatisfaction with incoming student competence in mathématiques.

Year 5

Perceptions of the degree of variation among incoming students' competencies are very similar for Calculus and Algebra teachers, over 50 percent of whom believe there is a great deal of variation, with only 6 percent thinking it to be very little. Relations and Functions mathematics/mathématiques teachers, although agreeing there is a good deal of variation, view it as more moderate than do their colleagues. In mathématiques, variation is generally perceived to be considerably less for Calculus and Algebra.

Except for algèbre about 60 to 65 percent of teachers in all 3 mathématiques courses rated student preparation as good, and 25 to 35 percent rated it as fair: 27 percent of the algèbre teachers, however, rated the quality of preparation of incoming students as excellent, and 9 percent of them rated it as poor, indicating the variability in teachers' perceptions of incoming students' quality of preparation.

Fifty to 84 percent perceived the greatest variation to be in skills of incoming students, with 38 to 52 percent believing the area of greatest variation to be knowledge, and 16 to 66 percent believing it to be attitudes. Clearly, there is wide variation of perception among teachers.

TABLE 7.2

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4
PERCENTAGE RANGES OF TEACHERS PREFERRING A HIGHER LEVEL OF STUDENT COMPETENCE AT ENTRY

Major Topic	% Ranges of Teachers															
	Mathematics								Mathématiques							
	Year 4 General				Year 4 Advanced				Year 4 General				Year 4 Advanced			
	0	1-20	21-40	41-60	0	1-20	21-40	41-60	0	1-20	21-40	41-60	0	1-20	21-40	41-60
I Basic Arithmetic (12)[a]		3[b]	7	2		7	5		2	7	2	1		6	5	1
II Business Arithmetic (12)	1	10	1		8	4			4	8			12			
III Basic Algebra (22)	1	10	6	5	1	8	13		6	7	8	1	1	7	9	5
IV Quadratic Functions and Equations (12)	1	9	2			6	6		5	6	1			2	9	1
V Exponential and Logarithmic Functions (14)		9	4	1	1	9	4		6	7	1			4	9	1
VI Sequences and Series (5)		4	1			5			2	3			1	4		
VII Analytic Geometry and Vectors (15)	3	12			4	10	1		10	5			9	4	1	1
VIII Synthetic Geometry (10)	4	6			2	7	1		8	2			3	5	2	
IX Trigonometry, Complex Numbers & Statics (18)	6	10	2		7	5	6		11	5	2		7	3	6	2
X Calculus (15)	15				15				13	2			15			
XI Statistics and Probability (10)	1	9			8	2			7	3			10			

[a] Number of subtopics in parentheses

[b] Number of subtopics with which % range was dissatisfied

Perceptions were similar from course to course about the quality of student preparation: attitudes were thought to be satisfactory by 40 to 50 percent, skills satisfactory by 20 to 44 percent and knowledge by 18 to 24 percent. Variability in the case of mathématiques teachers was considerable: 58 to 80 percent of the teachers were satisfied with preparation in knowledge, 0 to 50 percent in skills, and 25 to 80 percent in attitudes. No mathématiques teachers of Relations and Functions thought students were well-prepared in skills, and only 17 percent of the Calculus teachers felt they were.

With respect to lack of preparation, 45 to 78 percent of teachers were agreed that skills were most often deficient. Deficiency in knowledge and appropriate attitudes were rated as somewhat similar (knowledge by 18 to 45 percent of teachers, attitudes by 8 to 30 percent). Mathématiques teachers in all 3 courses were less dissatisfied with students' preparation.

Year 5 teachers see variation in students' competence as considerable, particularly the Calculus and Algebra teachers. Preparation is generally satisfactory; most teachers did not rate students as well prepared. Many teachers agreed that students were deficient in skills.

Table 7.3 indicates year 5 teachers' dissatisfaction with student competence. Dissatisfaction is noticeably lower than it was for year 4 courses, since for very few courses or topic areas are more than 20 percent of teachers dissatisfied with any topics. The course for which there is greatest dissatisfaction is Relations and Functions yet even here the picture is variable. Between 12 and 47 percent of mathematics' teachers and between 15 and 54 percent of mathématiques teachers were "dissatisfied" with 14 or more of the 16 basic topics listed. In mathematics dissatisfaction was greatest with Function as a mapping (47 percent) and Standard trigonometric formulae and applications (41 percent) and in mathématiques courses with Phase-shift, Period and amplitude (54 percent) and Inverse of a function (46 percent), Equations and graphs of conics (46 percent) and Standard trigonometric formulae and applications (46 percent).

TABLE 7.3

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5
PERCENTAGE RANGES OF TEACHERS PREFERRING A HIGHER
LEVEL OF STUDENT COMPETENCE AT ENTRY

Major Topics	% Ranges of Teachers											
	Relations & Functions				Calculus				Algebra			
	0	1-20	21-40	41-60	0	1-20	21-40	41-60	0	1-20	21-40	41-60
Mathematics												
I Relations and Functions (16)		5[a]	8	3								
II Calculus (64)					17	44	3					
III Algebra (22)										20	2	
IV Common Topics (21)	9	12			14	7						
V Probability and Statistics (37)	28	9			37				31	6		
Mathematiques												
I Relations and Functions (16)		1	11	3[b]								
II Calculus (64)					52	10	2					
III Algebra (22)										15	6	1
IV Common Topics (21)									15	6		

[a]Number of subtopics with which % range of teachers was dissatisfied.

[b]One subtopic was in the category 61-80%

In Calculus, there were fewer than 15 percent of teachers dissatisfied with all but 3 of the initial 15 topics. The topics producing greater dissatisfaction were: Limit of a function: Intuitive approach via sequences and series (31 percent); Rate of change: slopes, secants, Tangents (24 percent); Further applications: velocity, acceleration (22 percent).

Student competence in Algebra was regarded as moderately unsatisfactory with mathématiques teachers more dissatisfied than mathematics ones. Student entry levels to 6 of the 22 basic topics were unsatisfactory to between 27 and 45 percent of the mathématiques teachers. They were Geometric uses of vectors (45 percent); Vectors as ordered pairs or triplets and dot-product (36 percent each); and Fundamental counting principles of sets, Vectors (27 percent); Definition and Properties (27 percent); and Linear combinations of vectors (36 percent). The topic area of Vectors (with 6 subtopics) was definitely the area of greatest dissatisfaction for both sets of teachers. In topics common to the three courses, only the three topics comprising the areas Matrices and transformations were viewed as more than marginally unsatisfactory.

It is noticeable that 20 to 40 percent of Relations and Functions teachers are dissatisfied with incoming competence in 9 and 11 respectively of the 16 regular topics listed. They show less, though not exactly negligible, dissatisfaction with competence in common topics.

Calculus teachers show hardly any real dissatisfaction, particularly mathématiques ones - only very small percentages, usually 2 to 6 percent being dissatisfied with individual topics. Limit of function, and Rate of change, the first two topics of the course are viewed as unsatisfactory by one-quarter to one-third of all teachers.

Apart from the first three Vector topics, which show percentages dissatisfied of between 18 and 45 percent, Algebra teachers seem quite satisfied in general.

Data from department heads confirmed these views. In their judgment student competence in "basic skills" has decreased over the last 10 years. Among reasons advanced were "less priority given to schools", "broader, less intense coverage", "automatic promotion by age" and "less drill, more entertainment in public school".

Variation in competence was judged substantial by all but one department head: "more students with poorer marks going into year 5"; "wide choice"; and "excessive parental expectations" were among the reasons cited. One fairly typical comment was "no streaming according to ability; too much choice in options; difficult for students to assess own abilities".

All department heads thought student attitudes had changed, that in general students were less willing to work hard in school; more students held jobs, and there was a tendency to view education and "marks" as less important. These views seemed more characteristic of year 4 than year 5 students.

4. OTHER FACTORS INFLUENCING TEACHING

Teachers were asked to assess the extent to which various considerations influenced the teaching of the course (see Table 7.4). In year 4, the most important considerations were the assigned course outline (Mathematics departments are in the habit of developing fairly detailed outlines of topics and time allocations), the knowledge of the subject by incoming students, and the Ministry guidelines. Interests of students ranked as the most important factor in year 4 general mathématiques and was also seen as important (ranked 3) by mathematics teachers.

Mathematics teachers in year 5 were apparently influenced most by the assigned course outline, and by the principal textbooks, while mathématiques teachers were equally influenced by the Ministry guidelines and their own interests and training.

It would appear that, in general, year 4 and year 5 mathematics teachers are well qualified and experienced. They believe that there is considerable variation in competency in students coming into their courses, particularly at the year 4 level. Overall, preparation is apparently acceptable, even good at year 5 level of skills. Dissatisfaction with knowledge is moderate for year 4 teachers, low for year 5.

Prerequisites are practically universal, while assigned course outlines, Ministry guidelines, texts used, and the teachers' own interests are other factors identified as important influences upon the teaching of courses.

TABLE 7.4

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES
FACTORS INFLUENCING THE TEACHING OF THE COURSE

Factor	Year 4				Year 5					
	General		Advanced		Relations & Functions		Calculus		Algebra	
	WM[a]	R[b]	WM	R	WM	R	WM	R	WM	R
					Mathematics					
Interests of students	1.9	3	1.3	7	1.6	7	1.5	8	1.8	5
Student's knowledge	2.2	1	2.2	3	2.3	1	1.8	6	1.8	5
Relationship with other courses	0.9	8	1.2	8	1.7	5	1.8	6	1.8	5
Information on student's careers	1.5	5	1.5	6	1.5	8	2.1	1	1.9	4
Ontario Ministry of Education guidelines	1.5	5	2.3	1	2.1	3	2.0	4	2.1	2
Assigned course outlines	2.2	1	2.3	1	2.2	2	2.1	1	2.0	3
Teacher's special interests or training	1.3	7	1.6	5	1.7	5	2.0	4	1.8	5
Principal texts	1.6	4	2.1	4	1.9	4	2.1	1	2.3	1
Staffing	0.4	9	0.3	9	0.5	9	0.6	9	0.5	9
					Mathématiques					
Interests of students	2.2	1	2.1	4	2.2	4	2.2	3	1.5	6
Student's knowledge	1.9	4	1.9	6	2.1	5	2.2	3	1.4	7
Relationship with other courses	1.0	8	1.3	8	1.1	8	1.8	6	1.9	5
Information on student's careers	1.7	5	2.1	4	1.5	6	1.6	8	2.0	3
Ontario Ministry of Education guidelines	2.0	2	2.2	3	2.8	1	2.4	2	2.5	1
Assigned course outlines	1.6	6	1.4	7	1.2	7	1.7	7	1.1	8
Teacher's special interests or training	2.0	2	2.6	1	2.6	2	2.7	1	2.5	1
Principal texts	1.3	7	2.3	2	2.3	3	1.9	5	2.0	3
Staffing	0.9	9	1.3	8	0.1	9	0.7	9	0.5	9

[a] WM=weighted mean. Each category was assigned a weighting: 0-not at all; 1-to a small extent; 2-to a moderate extent; 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b] R-rank. Factors were ranked on the basis of weighted means.

C. Characteristics of the Course

1. AIMS OF THE COURSE

Teachers were asked to rate the degree to which they emphasized 33 general aims in their mathematics courses using a response code ranging from 0-no emphasis to 3-a great deal of emphasis. The aims can be considered as falling, in general, into one of the 5 basic categories below:

- A. Basic Applied Skills (Aims 1-5)
- B. Personal Work Habits or Characteristics (6-8)
- C. Basic Mathematical Abilities (9-15)
- D. Higher Mathematical Abilities (16-23)
- E. Appreciation of, or Attitudes to Mathematics (24-33)

Year 4

Table 7.5 summarizes data on the emphasis given to individual aims by year 4 teachers. Rank orders vary considerably from course to course, so generalizations are difficult. However, the two aims which received the greatest emphasis in year 4 were clearly "Conceptual and practical tools for mathematical application", varying in rank from 1 to 6 across the four courses considered, and "Ability to think logically in order to solve problems systematically and make rational decisions", ranked between 1 and 6. Other aims receiving a high rank were "Sound and systematic study habits"; Positive attitudes for mathematics"; "Skills needed for further courses or work in mathematics"; and "Ability to understand a problem stated in English and translate it into mathematical language to solve it". Very few aims were rated 3 (great deal of emphasis) by over 50 percent of the respondents in a given course; the highest percentages of teachers who responded 3 were 71 percent for "Ability to use and understand fundamental terminology", and 65 percent for "Ability to understand a problem stated in English and translate it into mathematical language to solve it", with both percentages being provided by the year 4 advanced teachers. In mathématiques courses, "Ability to think logically in order to solve problems systematically and make rational decisions", was rated 3 by 71 percent of the year 4 advanced teachers.

An attempt was made to determine the relative emphasis placed on each of the 5 groups of aims (see Table 7.6) by tabulating and summarizing the

TABLE 7.5

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	Mathematics				Mathématiques			
	General		Advanced		General		Advanced	
	WM[a]	R[b]	WM	R	WM	R	WM	R
1. Ability to use and understand fundamental terminology	2.3	4	2.7	2	1.6	12	2.4	4
2. Conceptual and practical tools for mathematical application	2.5	1	2.3	6	2.8	1	2.4	4
3. Skills needed for further courses or work in mathematics	2.4	2	2.9	1	1.9	6	2.3	7
4. Ability to apply knowledge and skills to other subject areas or situations	1.7	11	1.5	23	2.2	2	1.6	22
5. Skills related to subsequent occupations	1.6	12	1.2	31	1.6	12	0.7	33
6. Sound and systematic study habits	2.0	8	2.1	8	2.1	5	2.6	1
7. Ability to work independently	1.8	9	2.1	8	2.2	2	2.2	10
8. Ability to assess own skills and abilities	1.3	21	1.5	23	0.5	32	1.1	29
9. Ability to estimate an answer	1.8	9	1.6	19	1.5	14	1.9	17
10. Ability to check the reasonableness of an answer	2.1	7	2.0	11	1.8	10	2.5	3
11. Ability to construct, use and interpret concrete models and mathematical diagrams	1.6	12	1.8	13	1.3	18	2.1	12
12. Ability to understand a problem stated in English and translate it into mathematical language to solve it	2.4	2	2.6	3	1.9	6	2.2	10
13. Ability to use symbolic notation	1.6	12	2.2	7	1.5	14	2.1	12
14. Ability to read a mathematical textbook	1.3	21	1.5	23	1.0	23	1.2	27
15. Familiarity with basic literature and use of resources (library, texts, other students and colleagues)	0.7	32	0.9	33	0.7	30	1.1	29
16. Ability to write a proof	0.9	30	2.0	11	1.0	23	2.0	15

[a] WM=weighted mean. Each category was assigned a weighting: 0-not at all; 1-to a small extent; 2-to a moderate extent; 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b] R=rank. Factors were ranked on the basis of weighted means.

TABLE 7.5 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	Mathematics General WM	R	Mathematics Advanced WM	R	Mathématiques General WM	R	Mathématiques Advanced WM	R
17. Ability to make and test generalizations	1.0	28	1.3	29	0.5	32	0.9	31
18. Ability to work intuitively and use appropriate levels of intuition and rigour	1.1	27	1.6	19	0.9	26	1.4	25
19. Ability to understand logical argument and the direction of an implication	1.4	18	1.8	13	1.3	18	2.3	7
20. Ability to use examples and counterexamples	1.3	21	1.6	19	1.4	17	2.1	12
21. Ability to think logically in order to solve problems systematically and make rational decisions	2.3	4	2.5	4	1.9	6	2.6	1
22. Ability to solve multi-stage problems	1.6	12	2.1	8	1.9	6	2.4	4
23. Ability to formulate and work from usable definitions	1.5	17	1.8	13	1.2	21	1.7	19
24. Appreciation and/or understanding of the underlying logical structure of mathematics	1.4	18	1.8	13	0.8	27	1.3	26
25. In-depth understanding of some area or topic in mathematics	1.6	12	1.7	18	1.5	14	1.8	18
26. Appreciation of the nature and importance of proof in mathematics	0.9	30	1.4	26	0.8	27	1.6	22
27. Appreciation of the contribution of mathematics to civilization	1.1	27	1.0	32	0.8	27	0.9	31
28. Appreciation of the power of mathematics to solve complex problems	1.3	21	1.6	19	1.2	21	1.6	22
29. Understanding and appreciation of the unity of mathematics through the interrelationships of its various branches	0.9	30	1.4	26	1.0	23	1.7	19
30. Appreciation of mathematical elegance, e.g., in a proof	0.6	33	1.4	26	0.7	30	1.7	19
31. Judgement and discrimination about appropriate procedures and their relevance to solving specific problems	1.4	18	1.8	13	1.8	10	2.0	15
32. Positive attitudes for mathematics	2.2	6	2.4	5	2.2	2	2.3	7
33. Appreciation of mathematics as a human activity aimed at extending man's knowledge and his under standing and use of his environment	1.2	25	1.3	29	1.3	18	1.2	27

rank order for every aim in each category, and deriving a mean rank. A final rank of 1,2,3,4, or 5 was then assigned to each category. In 3 of the 4 year 4 courses, Category A (Basic Applied Skills) was ranked highest in emphasis and, for all courses, Categories A, B (Personal Work Habits or Characteristics), and C (Basic Mathematical Abilities) were ranked 1, 2, or 3. The order for year 4 general was 1, 2, 3 for all courses. There was a less marked emphasis on aims in these categories in the year 4 advanced course. The result seems a reasonable one since the advanced course is more academic and university-oriented; hence, it can be expected to give more weight, relatively to higher-order cognitive and affective aims.

TABLE 7.6

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4
GROUPS OF AIMS - RANKED BY DEGREES OF EMPHASIS

Aims	Mathematics		Mathématiques	
	General	Advanced	General	Advanced
A. Basic Applied Skills	1	1	1	3
B. Personal Work Habits or Characteristics	2	3	2	1
C. Basic Mathematical Abilities	3	2	3	2
D. Higher Mathematical Abilities	4	4	4	4
E. Appreciation of Mathematics	5	5	5	5

Year 5

Analyses similar to those done for year 4 were carried out for the three year 5 courses. The results for individual aims are given in Table 7.7. Overall, "Skills needed for further courses or work in mathematics" received the most emphasis, followed by: "Ability to use and understand fundamental terminology"; "Conceptual and practical tools for mathematical application"; and, "Ability to understand a problem stated in English and translate it into mathematical language to solve it". Again, relatively few aims were rated 3 by over 50 percent of the teachers in a given course, but those highest in the 3 category were the four aims already noted. Apart from those four, variability in ranking occurred quite frequently.

TABLE 7.7

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	Mathematics						Mathématiques					
	Relations & Functions		Calculus		Algebra		Relations & Functions		Calculus		Algebra	
	WM[a]	R[b]	WM	R	WM	R	WM	R	WM	R	WM	R
1. Ability to use and understand fundamental terminology	2.7	2	2.8	1	2.8	1	2.5	3	2.0	13	2.5	5
2. Conceptual and practical tools for mathematical application	2.5	3	2.6	3	2.6	3	2.1	13	2.9	1	2.8	2
3. Skills needed for further courses or work in mathematics	2.8	1	2.8	1	2.8	1	2.5	3	2.8	2	3.0	1
4. Ability to apply knowledge and skills to other subject areas or situations	1.8	16	1.9	17	1.8	22	1.4	26	1.8	20	1.4	24
5. Skills related to subsequent occupations	1.1	31	1.2	31	1.1	32	1.0	32	0.8	33	0.8	31
6. Sound and systematic study habits	2.0	12	2.1	9	2.3	7	2.8	1	2.5	3	2.2	8
7. Ability to work independently	2.1	10	2.1	9	2.2	11	2.2	7	2.2	10	2.0	16
8. Ability to assess own skills and abilities	1.3	30	1.6	26	1.5	29	1.3	29	0.9	32	0.6	32
9. Ability to estimate an answer	1.5	27	1.6	26	1.6	28	2.2	7	1.6	23	1.3	27
10. Ability to check the reasonableness of an answer	1.8	16	2.0	14	2.0	15	2.5	3	1.9	18	2.1	13
11. Ability to construct, use and interpret concrete models and mathematical diagrams	1.9	14	1.9	17	2.2	11	1.9	16	2.2	10	1.8	18
12. Ability to understand a problem stated in English and translate it into mathematical language to solve it.	2.5	3	2.6	3	2.5	4	2.2	7	2.4	5	2.6	3

[a] WM=weighted mean. Each category was assigned a weighting: 0-not at all, 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b] R=rank. Factors were ranked on the basis of weighted means.

TABLE 7.7 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	Mathematics						Mathématiques					
	Relations & Functions		Calculus		Algebra		Relations & Functions		Calculus		Algebra	
	WM	R	WM	R	WM	R	WM	R	WM	R	WM	R
13. Ability to use symbolic notation	2.3	8	2.5	5	2.5	4	1.9	16	2.0	13	2.6	3
14. Ability to read a mathematical textbook	1.6	22	1.7	22	1.9	19	1.4	26	1.6	23	1.2	28
15. Familiarity with basic literature and use of resources (library, texts, other students and colleagues)	0.8	33	0.9	33	1.0	33	1.0	32	1.4	27	1.1	29
16. Ability to write a proof	2.1	10	1.8	20	2.3	7	2.2	7	1.9	18	2.2	8
17. Ability to make and test generalizations	1.4	29	1.5	29	1.7	25	1.5	22	1.1	29	1.5	22
18. Ability to work intuitively and use appropriate levels of intuition and rigour	1.6	22	1.6	26	1.8	22	1.6	19	1.4	27	2.2	8
19. Ability to understand logical argument and the direction of an implication	1.9	14	1.9	17	2.0	15	2.1	13	2.0	13	2.2	8
20. Ability to use examples and counter-examples	1.7	19	1.7	22	1.8	22	1.5	22	1.8	20	1.4	24
21. Ability to think logically in order to solve problems systematically and make rational decisions	2.4	6	2.5	5	2.5	4	2.5	3	2.5	3	2.5	5
22. Ability to solve multi-stage problems	2.4	6	2.4	7	2.3	7	2.6	2	2.4	5	2.4	7
23. Ability to formulate and work from usable definitions	2.0	12	2.1	9	2.1	13	1.4	26	1.5	26	1.4	24
24. Appreciation and/or understanding of the underlying logical structure of mathematics	1.7	19	2.0	14	2.0	15	1.6	19	1.6	23	1.7	19

TABLE 7.7 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5
TEACHERS' EMPHASIS ON GENERAL AIMS

Aim	Mathematics						Mathématiques					
	Relations & Functions		Calculus		Algebra		Relations & Functions		Calculus		Algebra	
	WM	R	WM	R	WM	R	WM	R	WM	R	WM	R
25. In-depth understanding of some area or topic in mathematics	2.3	8	2.1	9	2.1	13	2.2	7	2.3	8	2.1	13
26. Appreciation of the nature and importance of proof in mathematics	1.8	16	1.7	20	2.0	15	1.8	18	2.1	12	2.0	16
27. Appreciation of the contribution of mathematics to civilization	1.1	31	1.2	31	1.2	31	1.1	30	1.1	29	0.6	32
28. Appreciation of the power of mathematics to solve complex problems	1.6	22	2.1	9	1.9	19	1.6	19	2.0	13	1.7	19
29. Understanding and appreciation of the unity of mathematics through the inter-relationships of its various branches	1.6	22	1.8	20	1.7	25	1.5	22	2.0	13	1.5	22
30. Appreciation of mathematical elegance, e.g. in a proof	1.6	22	1.7	22	1.7	25	1.5	22	1.7	22	1.7	19
31. Judgement and discrimination about appropriate procedures and their relevance to solving specific problems	1.7	19	2.0	14	1.9	19	2.0	15	2.4	5	2.1	13
32. Positive attitudes for mathematics	2.5	3	2.3	8	2.3	7	2.2	7	2.3	8	2.2	8
33. Appreciation of mathematics as a human activity aimed at extending man's knowledge, and his understanding and use of his environment	1.5	27	1.4	30	1.3	30	1.1	30	1.1	29	1.1	29

Table 7.8 summarizes the results of the analysis carried out to determine relative emphasis on each group of aims. In all three English speaking courses, Category A (Basic applied skills) was ranked 1, as it was for Calculus and for Algebra in French-speaking courses; in the Relations and Functions mathématiques course it was rated only 3. Category D (Higher mathematical abilities) received a rank of 3 in Relations and Functions (mathematics) and in algèbre courses, indicating that teachers of these courses ranked that type of aim higher than did their colleagues. On the other hand, Category B (Personal work habits or characteristics) received a rank of 4 by two groups of teachers: Relations and Functions, and algèbre. The final ranks of 1 and 5 are reasonably reliable for the five categories, but the ranks in between, i.e., 2, 3, and 4 are less so; caution is needed when making generalizations which involve these middle ranks.

TABLE 7.8

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5
GROUPS OF AIMS - RANKED BY DEGREES OF EMPHASIS

Aim	Mathematics			Mathématiques		
	Relations & Functions	Calculus	Algebra	Relations & Functions	Calculus	Algebra
A. Basic applied skills	1	1	1	3	1	1
B. Personal work habits or characteristics	4	3	3	1	2	4
C. Basic mathematical abilities	2	2	2	2	3	2
D. Higher mathematical abilities	3	4	4	4	4	3
E. Appreciation of mathematics	5	5	5	5	5	5

It is interesting to note that there was greater homogeneity among choice of top aims in year 5 than in year 4. When one considers aims which are in the top 5 for any of the courses involved, only 9 aims appear for year 5 as opposed to 12 for year 4, which included the additional three aims: "Ability to apply knowledge and skills to other subject areas or situations;" "Ability to work independently;" and "Positive attitudes for mathematics."

Emphasis in both year 4 and year 5 seems to be focussed on aims from Category A (Basic applied skills). The two aims that received the greatest overall emphasis were "Conceptual and practical tools for mathematical application;" and "Skills needed for further courses or work in mathematics." "Ability to think logically in order to solve problems systematically and make rational decisions" ranked third overall. In year 4, there appears to be a greater tendency to emphasize the aims of Category B (Personal work habits or characteristics) than there is in year 5. It is likely that this finding reflects the differing student bodies, with the year 4 students being more heterogeneous, both in abilities and attitudes, than their year 5 counterparts.

2. *OBJECTIVES OF THE COURSE*

In this section, various analyses made on the responses to Section IV of the questionnaire (Course content and student competence) will be discussed. Since a later section will be devoted to each of the two interfaces, year 4 and year 5 will be discussed separately. The sequence of discussion will be to consider time allocation to topics first, follow this with an examination of the extent to which topics are taught, and conclude with a discussion of changes in student competence from entry to exit.

Year 4

(a) Time Allocation

A good overall impression of time emphasis is obtained by observing Table 7.9 and Table 7.10 in which the mean percentage time allocations for each of the 11 topic areas listed in the questionnaire are given for both mathematics and mathématiques general and advanced courses.

TABLE 7.9

SECONDARY SCHOOL MATHEMATICS YEAR 4
AVERAGE PERCENTAGE OF TIME ALLOCATED TO GROUPS OF TOPICS
AND PERCENTAGE OF TEACHERS TEACHING REGULAR COURSE TOPICS

Topic Area	General		Advanced	
	% Time Allocated	% Teaching Topic	% Time Allocated	% Teaching Topic
1. Basic arithmetic	12.4	33	3.4	17
2. Business arithmetic	10.5	21	0.7	2
3. Basic algebra	23.4	35	13.9	27
4. Quadratic functions and equations	11.1	29	27.6	74
5. Exponential and logarithmic functions	10.4	34	19.7	65
6. Sequences & series	7.7	49	6.8	57
7. Analytic geometry and vectors	3.1	11	6.0	17
8. Synthetic geometry	1.1	3	5.8	17
9. Trigonometry, complex numbers and statics	15.4	21	16.0	40
10. Calculus	0.5	67	0.1	0.3
11. Statistics and probability	4.6	21	0.0	0.2

TABLE 7.10

SECONDARY SCHOOL MATHEMATIQUES YEAR 4
AVERAGE PERCENTAGE OF TIME ALLOCATED TO GROUPS OF TOPICS
AND PERCENTAGE OF TEACHERS TEACHING REGULAR COURSE TOPICS

Topic Area	General		Advanced	
	% Time Allocated	% Teaching Topic	% Time Allocated	% Teaching Topic
1. Basic arithmetic	11.8	24	3.1	21
2. Business arithmetic	11.7	20	0.5	1
3. Basic algebra	20.8	24	15.2	34
4. Quadratic functions and equations	7.4	19	25.4	74
5. Exponential and logarithmic functions	14.6	33	21.1	66
6. Sequences & series	10.2	48	6.0	50
7. Analytic geometry and vectors	1.7	6	4.1	9
8. Synthetic geometry	0.3	3	5.0	18
9. Trigonometry, complex numbers and statics	14.4	22	19.6	55
10. Calculus	0.0	2	0.0	0
11. Statistics and probability	6.3	9	0.0	0

Emphasis is reasonably similar for all courses. In the general course, each of Arithmetic (Sections I and II), Basic Algebra (Section III), and Functions (Sections IV and V) accounts for about 15 percent. In the advanced course there is much less emphasis than in the general course on the "basic" topic areas and correspondingly greater emphasis (about 45 percent) on Functions.

In analysing the raw information concerning time allocations data, mean percentage times and standard deviations were found for individual topics. Scrutiny of these data show that the standard deviations are comparable to the means, e.g., for Ordinary annuities (II.5) taught in the general course (mathematics) the mean time spent was 3 percent and the standard deviation was 3.5. Such statistical correspondence is a general feature of the data and it indicated that wide variations exist in times allocated by individual teachers.

(b) Teaching of Particular Topics

The percentage of teachers teaching each topic was calculated by finding the number of teachers who indicated a difference between entry and exit student competence levels for each topic and expressing that number as a percentage of the total number of teachers responding for a course. These percentages vary enormously, as one might expect. Tables 7.9 and 7.10 show the mean percentage for each of the 11 major topic areas in both mathematics and mathématiques courses.

(i) Year 4 General. In year 4 general Mathematics courses, percentages of teachers teaching individual topics varied greatly. The topic area taught by the highest percentages are those related to Sequences and series, Basic arithmetic, Basic algebra, and Basic functions (Quadratic, Exponential, Logarithmic, and Trigonometric). Emphasis is concentrated on the more basic concepts and techniques: for example, 90 percent of the teachers teach Factoring (III.9), and 70 percent teach both Operations and Rational algebraic fractions (III.10) and Operations with radicals and irrationsls (III.12), while only 2 percent teach solutions of Linear equations using determinants (III.6) or Matrices (III.7). Two of the five basic Sequences and series topics are taught by 80 percent or more of the teachers, while Basic identities and expansion (IX.2) are taught by less

than 20 percent of the teachers. The topic areas of Synthetic geometry and Calculus receive almost no teaching and Analytic geometry and vectors receives only a moderate amount.

(ii) Year 4 Advanced. For the year 4 advanced course, topics taught by the greatest percentages of teachers (40 percent-70 percent) occurred mainly in the major areas of Quadratic functions and equations, Exponential and logarithmic functions, Sequences and series, and Trigonometry, complex numbers, and statics, while many topics in Basic Algebra tended to be taught by 14 percent to 60 percent of the teachers, and ones in Basic arithmetic, by 6 to 20 percent of them. There is some emphasis on Geometry. The statistics are averages, however, and within topic areas there are wide differences for individual topics. For more specific information, the appropriate table in Vol. 2 should be consulted (Table 15.61).

The data for the year 4 general and advanced mathématiques courses in Table 7.10 show that in general, topic emphasis in these schools is much the same as it is for year 4 mathematics.

A different perspective on the variability of content taught is afforded by Table 7.11 for year 4 general and advanced courses. For each of the 11 major content areas, this table shows the percentage ranges of teachers who teach numbers of topics in a given content area. Thus, in mathematics, 41 to 60 percent of year 4 general teachers teach 3 of the 12 topics in Basic arithmetic. Generally, there is a similarity in the entries for mathématiques.

Entries at the 0 percent range indicate the number of topics that are not taught at all. For year 4 general, the number of topics not taught varies from negligible in Basic arithmetic to quite high in the topic area Calculus.

In very few topic areas do high percentages of teachers teach the majority of topics, although, to some extent, this description can be applied to Sequences and series and to Trigonometry, complex numbers and statics. There is considerable variability across topic areas with correspondence between mathematics and mathématiques courses fairly high.

TABLE 7.11

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4
NUMBER OF TOPICS TAUGHT BY PERCENTAGE RANGES OF TEACHERS

	Mathematics											
	General						Advanced					
	0%	1-20%	21-40%	41-60%	61-80%	81+%	0%	1-20%	21-40%	41-60%	61-80%	81+%
Basic arithmetic (12)[a]		3[b]	6	3				8	4			
Business arithmetic (12)	1	7	3	1			7	5				
Basic algebra (22)	1	9	1	6	4	1	3	7	7	3	2	
Quadratic equations and functions (12)		5	4	1	1	1		1		2	4	5
Exponential and logarithmic functions (14)		6	2	3	3			3		2	3	6
Sequence and series (5)	1			1	2	1		1			4	
Analytic geometry and vectors (15)	2	11	2					11	2	2		
Sythetic geometry (10)	3	7						7	1	2		
Trigonometry, complex numbers and statics (18)	5	7	2	1	3		4	4	2		4	4
Calculus (15)	10	5					13	2				
Statistics and probability (10)	1	4	5				9	1				

	Mathématiques											
	General						Advanced					
	0%	1-20%	21-40%	41-60%	61-80%	81+%	0%	1-20%	21-40%	41-60%	61-80%	81+%
Basic arithmetic (12)[a]	1[b]	4	6	1			1	6	3	2		
Business arithmetic (12)	1	5	5	1			11	1				
Basic algebra (22)	3	8	7	2	2		2	3	8	7	1	1
Quadratic equations and functions (12)	2	6	3	1					2	1	5	4
Exponential and logarithmic functions (14)		5	4	3	2			2	1	2	3	6
Sequences and series (5)	1		1	3				1		1	3	
Analytic geometry and vectors (15)	6	9					9	2	4			
Synthetic geometry (10)	8	2					1	5	2	2		
Trigonometry, complex numbers and statics (18)	6	3	5	2	2		6	1	1	5	3	2
Calculus (15)	13	2					15					
Statistics and probability (10)	4	5	1				10					

[a]Number of subtopics in parentheses

[b]Number of subtopics taught by percentage range of teachers

In year 4 advanced courses, not many of the topics listed in Calculus are taught; the areas of greatest concentration are Quadratic equations and functions, and Exponential and logarithmic functions.

(c) Teaching of Core and Supplementary Topics

An attempt was made to assess the extent to which topics listed in the Ministry Guidelines for Applications of Mathematics 2 as core or supplementary were taught in the year 4 courses. The results are given in Tables 7.12 and 7.13. In year 4 general, all the core topics were represented by 17 items in the content section of the questionnaire; by chance all supplementary topics were covered by a second set of 17 questionnaire items. Table 7.12 shows that the mean time allocations for the 17 core topics in the mathematics/mathématiques courses were 26.9 percent and 23.7 percent. The percentage of teachers teaching (and rating) each topic is also provided. Similar analysis of the 17 supplementary topics for the mathematics indicated a mean time allocation of 34 percent. Thus, on the average, some 60 percent of teaching time was spent on topics designated as core or supplementary by the Ministry. Comparison of Table 7.12 with Table 7.9 reveals that much of the remaining time was allocated to Basic arithmetic (about 15 percent) and Basic algebra (about 25 percent). The findings support the view that students are not well prepared in the "basics" and, therefore, considerable time is spent in an attempt to remedy the lack of preparation.

A similar analysis of the teaching of core topics was carried out for the year 4 advanced courses (Table 7.13). A mean time of about 60 percent was spent on 36 questionnaire topics which formed the core, 26 of them being allocated a mean time of over 1 percent and 19 of them being taught by at least 70 percent of all teachers sampled. In addition, of 34 questionnaire topics all of them supplementary topics in the course, 7 were taught by over 50 percent of the teachers.

Clearly, there is much greater coherence and coverage of regular course topics than in year 4 general.

(d) Student Achievement at Entry and Exit

Means and standard deviations for average entry and exit competency for each individual topic in the various topic areas defined in the questionnaire

TABLE 7.12

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4 GENERAL QUESTIONNAIRE TOPICS REPRESENTING CORE TOPICS LISTED IN MINISTRY GUIDELINES FOR APPLICATIONS OF MATHEMÁTICS 2

Core Topic	Mean % Time Allocated		% Teaching	
	Mathematics	Mathématiques	Mathematics	Mathématiques
Ordinary annuities	3.0 3.0	1.7 1.7	58	38
Operations with rational algebraic fractions	1.8	1.5	70	46
Four fundamental operations on polynomials	2.5 4.3	2.2 3.7	76	46
Higher degree polynomials: graphs, use of factor theorem and factoring	0.5	0.0	24	0
Quadratic equations: completing the square, formula, problems	3.7	2.8	84	54
Quadratic inequalities	4.2		90	15
Applications: non-real roots, related equations such as $4-3x - x^2 = 12$	0.6 9.0	0.3 3.1	30	15
Sequences: definitions, general term, graphs, limits	2.5	2.1	84	54
Applications: A.P., G.P., Fibonacci	1.7	1.9	62	38
Series: definitions, notation, first n terms	2.0 6.2	2.4 6.4	80	54
Statistics: uses, data gathering, representation and interpretation	0.7	1.8	34	15
Descriptive statistics: mean, median, mode, standard deviation	0.9	1.5	34	15
Applications: in daily lives, industrial quality control (testing, sampling)	0.4	1.0	20	15

TABLE 7.12 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4 GENERAL QUESTIONNAIRE TOPICS REPRESENTING CORE TOPICS LISTED IN MINISTRY GUIDELINES FOR APPLICATIONS OF MATHEMATICS 2

Core Topic	Mean % Time Allocated		% Teaching	
	Mathematics	Mathématiques	Mathematics	Mathématiques
Use of counting techniques: permutations, combinations, tree diagrams	0.3	0.0	16	0
Empirical and a priori probability with real life and experimental (e.g., coin-tossing) examples	0.8	1.6	32	15
Law of large numbers, implications	0.2	0.2	22	8
Basic rules of probability: simple, compound, independent events	1.1	1.0	38	23
	4.4	7.1		
TOTAL TIME	26.9	22.0		

TABLE 7.13

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4 ADVANCED QUESTIONNAIRE TOPICS REPRESENTING CORE TOPICS LISTED IN MINISTRY GUIDELINES FOR APPLICATIONS OF MATHEMATICS 2

Core Topic	Mean % Time Allocated		% Teaching	
	Mathematics	Mathématiques	Mathematics	Mathématiques
Scientific notation: conversion to and from	0.5	0.5	31	43
Scientific notation: use in computation and estimation	0.6	0.5	37	36
Systems of linear equations in 2 unknowns and applications	0.7	1.3	31	57
Systems of linear equations in 3 unknowns.	0.2	0.1	14	14
Concept of relation: classes, graphing, inverse	2.1	3.3	67	57
Concept of functions: notation, and evaluation of functional values	2.1	2.1	78	86
	6.2	7.8		
Quadratic function and its properties: parabola, graph, symmetry, intercepts	5.8	4.1	98	93
Inverse of the quadratic function	1.2	1.3	74	79
Higher degree polynomials: graphs, use of factor theorem, and factoring	2.8	2.2	76	86
Quadratic equations: completing the square, formula, problems	5.2	3.8	92	93
Linear-quadratic systems	1.4	1.4	76	64
Theory of quadratic equations: nature of roots, discriminant	2.7	2.9	90	93
	19.1	15.7		
Graphs of common exponential functions	1.4	1.8	80	93
Definition of e^x, a^x, and Laws of exponents.	1.8	2.0	78	79
Exponential equations	1.6	1.6	96	79

TABLE 7.13 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4 ADVANCED QUESTIONNAIRE TOPICS REPRESENTING CORE TOPICS LISTED IN MINISTRY GUIDELINES FOR APPLICATIONS OF MATHEMATICS 2

Core Topic	Mean % Time Allocated		% Teaching	
	Mathematics	Mathématiques	Mathematics	Mathématiques
Logarithm: definition, relation to exponential	1.4	1.5	96	93
Laws of logarithms	2.3	2.9	94	93
Computations with logarithms	2.8	3.6	94	93
Applications in business and/or technology (growth and decay)	1.3	1.0	43	50
	12.6	14.4		
Sequences: definitions, general term, graphs, limits	1.9	1.5	80	64
Applications: A.P., G.P., Fibonacci	1.7	1.2	67	50
Series: definitions, notation, first n terms	1.6	1.3	76	64
Formulae: AP., G.P., convergent geometric	1.5	1.9	61	64
Mathematical induction	0.1	0.1	4	7
	6.8	6.0		
Derivation of various forms of the equation: two points, slope and point, intercepts, etc.	1.2	1.0	39	29
Identifying, constructing, and graphing a straight line from given data	0.4	1.0	26	29
Equation of circle and basic properties (symmetry, chords, intersection.)	1.2	0.8	47	29
	2.8	2.8		
Circle: definition, basic terminology and formulae.	0.8	0.7	40	50
Circle: chord, angle, secant, tangent properties	3.2	2.3	53	43

TABLE 7:13 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4 ADVANCED QUESTIONNAIRE TOPICS REPRESENTING CORE TOPICS LISTED IN MINISTRY GUIDELINES FOR APPLICATIONS OF MATHEMATICS 2

Core Topic	Mean % Time Allocated		% Teaching	
	Mathematics	Mathématiques	Mathematics	Mathématiques
Sphere: definition, formulae, properties	0.1	0.4	6	21
Similar figures in 2- and 3-space.	0.3	0.2	8	7
Solid geometry: mensuration	0.1	0.0	8	7
	4.5	3.6		
Primary and reciprocal trigonometric functions (definitions, graphs, properties).	2.8	2.9	90	86
Amplitude, periodicity, phase shift, and graphing	2.5	2.7	76	71
Laws of sines and cosines	2.3	2.3	88	64
Solution of right triangle	1.7	1.9	84	64
	9.3	9.8		
TOTAL TIME	61.3	60.1		

were generated by a computer program. The resulting print-outs are voluminous and contain a vast amount of information. It is not feasible to reproduce the data here; therefore, in this discussion, only a few representative comments can be made about competencies in individual topics. Where mentioned, they will be related to student competencies in the topic areas concerned.

(i) Year 4 General. (See Tables 7.14 and 7.15 for competency data for year 4 general and advanced). In Basic arithmetic, incoming students are judged to be least competent (1.1) in those topics relating to the metric system; most competent in "Fundamental operations with integers" (2.6), and "Fundamental arithmetic operations with fractions, decimals and integers" (2.6). Improvement in competence is perceived for all topics, with a mean improvement of 0.8 (from average entry of 2.0 to average exit of 2.8).

Very low entry levels are given for topics in Business arithmetic, yet improvement is considerable, that is, almost 2 points on the scale, for a number of topics. For example, "Ordinary annuities" moves from 0.2 to 2.9. For the topic area, the entry and exit means are 0.4 and 2.3, respectively and represent a difference of 1.9.

Both entry and exit levels are noticeably higher for Basic algebra topics; for example, "Generalized arithmetic": 2.2 and 3.2; "Factoring": 1.7 and 3.0. The entry and exit means for this topic area are 1.4 and 2.5, indicating an improvement of 1.1

As would be expected, entry levels for topics in Quadratic functions and equations are very low, but exit levels in some cases are quite high; for example, "Quadratic function and its properties" (0.4, 2.5); "Linear and quadratic systems" (0.4, 2.1). The entry and exit means are 0.3 and 2.0, an improvement of 1.7.

Trends in competence for the course as a whole can be seen from Table 7.14. Thus mean entry levels vary from 0.2 for Sequences and series (area VI) to 1.4 and 2.0 for Basic algebra and Basic arithmetic respectively, while the range of exit levels goes from 1.0 in Trigonometry to 2.8 in Basic arithmetic. The range of improvement in competence varies from a low of 0.8 points for Analytic geometry to a high of 2.4 points for Sequences and series.

TABLE 7.14

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4 GENERAL AVERAGE COMPETENCE LEVELS FOR ENTRY AND EXIT

	Topic Area	Mathematics					Mathématiques				
		Entry		Exit		%	Entry		Exit		%
		Mean	SD	Mean	SD	Responding	Mean	SD	Mean	SD	Responding
I	Basic arithmetic (12)	2.0	1.0	2.8	1.1	49	1.7	1.1	3.2	0.7	29
II	Business arithmetic (12)	0.4	0.6	2.3	1.4	72	.4	0.6	2.6	0.7	20
III	Basic algebra (22)	1.4	1.0	2.5	1.2	53	1.5	0.9	3.0	0.8	27
IV	Quadratic functions and equations (12)	0.3	0.6	2.0	1.2	61	.03	0.2	2.5	0.8	18
V	Exponential and logarithmic functions (14)	0.8	0.9	2.4	1.2	55	0.4	0.8	2.6	1.0	38
VI	Sequences and series (5)	0.2	0.5	2.6	0.9	39	0.4	0.7	2.6	0.7	37
VII	Analytic geometry and vectors (15)	0.5	0.8	1.3	1.4	77	0.3	0.6	2.2	0.8	6
VIII	Synthetic geometry (10)	0.4	0.9	0.9	1.3	84	0.5	0.7	2.2	0.5	3
IX	Trigonometry, complex numbers and statics (18)	0.6	0.9	1.0	1.4	68	0.5	0.7	2.7	0.6	22
X	Calculus (15)	0.0	0.2	1.6	1.8	89	0.2	0.5	2.7	0.5	3
XI	Statistics and probability (10)	0.3	0.5	2.0	1.2	72	0.2	0.4	2.7	0.5	92
	GRAND AVERAGE	0.9	1.0	2.2	1.3		0.8	1.0	2.8	0.8	
	ADJUSTED AVERAGE[a]	1.0	1.1	2.4	1.2						

[a]Based on Topic Areas I, II, III, IV, V, and VI.

TABLE 7.15

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4 ADVANCED
AVERAGE COMPETENCE LEVELS FOR ENTRY AND EXIT

	Topic Area	Mathematics					Mathématiques				
		Entry		Exit		%	Entry		Exit		%
		$\bar{X}$	SD	$\bar{X}$	SD	Responding	$\bar{X}$	SD	$\bar{X}$	SD	Responding
I	Basic arithmetic (12)	2.4	1.2	3.1	1.2	64	2.0	1.4	3.0	1.1	38
II	Business arithmetic (12)	0.3	0.6	0.9	1.2	88	0.0	0.0	3	0	1
III	Basic algebra (22)	1.9	1.2	2.9	1.3	58	2	1.3	3.1	1.1	54
IV	Quadratic functions and equations (12)	0.5	0.8	2.9	1.0	24	0.7	0.9	2.8	1.0	83
V	Exponential and logarithmic functions (14)	0.5	0.9	2.9	0.9	28	0.5	1.0	2.8	1.1	79
VI	Sequences and series (5)	0.1	0.3	2.7	1.0	36	0.1	0.3	2.8	1.0	60
VII	Analytic geometry and vectors (15)	0.9	1.1	2.0	1.4	74	1.4	1.0	2.4	1.3	19
VIII	Synthetic geometry (10)	1.0	0.9	2.3	1.3	74	1.2	1.0	2.8	1.3	24
IX	Trigonometry, complex numbers and statics (18)	0.9	1.0	2.7	1.3	54	0.6	0.8	2.8	1.3	44
X	Calculus (15)	0.0	0.0	0.1	0.4	93					
XI	Statistics and probability	0.0	0.2	0.1	0.4	94					
	GRAND AVERAGE	1.1	1.2	2.7	1.2		1.0	1.2	2.8	1.1	
	ADJUSTED AVERAGE[a]	1.0	1.2	2.8	1.2						

[a]Based on Topic Areas I, III, IV, V, VI, VII, VIII, and IX.

Only 12 of the 145 topics listed in the questionnaire are taught by 35 (70 percent) or more of the 50 teachers in year 4 general. Statistics of entry and exit levels are shown in Table 7.16 for these topics, which in essence form the core of the course as it is presently taught. The mean of these 12 entry levels is 1.5, with a range from 0.2 to 2.6 while the mean exit level is 3.0, with a range from 2.7 to 3.2. Based on this analysis, the expected mean improvement would be about 1.5 points.

From Table 7.16, it appears that the topics in which there is greatest improvement in competence, and in some cases, the highest level of exit competence, are Quadratic equations, Computations with logarithms and basic ideas about sequences and series.

The first five of these 12 topics are supposedly covered prior to year 4; of the remaining 7, 5 are core topics, and 2 (V.1 and V.8) supplementary topics.

This analysis further supports the view that teachers are spending a fair proportion of the course on "pre-year 4" topics.

(ii) Year 4 Advanced. Table 7.15 gives the data as would be expected: perceived entry levels of competency for individual topics and topic areas are higher than for year 4 general. For example, for Fundamental arithmetic the mean incoming competence levels are 4G: 2.6; 4A: 3.1; while for Scientific notation they are 4G: 2.1; 4A: 2.7. These differences are relatively stable throughout, as is confirmed by the overall mean entry levels, 4G: 2.0; 4A: 2.4.

The range of entry levels for both individual topics and topic areas is great. Incoming competence in some topics is seen as practically negligible; for example, Matrices (0), Series (0), Quadratic inequalities (0.3), while others have quite a high level of competence assigned to them: Solution of simple rational equations (2.9), Generalized arithmetic (3.3)

In Basic algebra most topics are seen to have at least 2.0 as the entry competency, with a few exceptions; for example, Systems of linear equations in 3 unknowns and the Concept of function, both taught extensively, have mean entry and exit levels of 1.3, 2.3; 1.7, 3.4 respecitively, indicating that the level of competence in them is rising by about 1 point for the first and by 1.7 for the second. The mean entry and exit levels for this whole topic area of 22 topics are 1.9 and 2.9.

Quadratic function topics are also extensively taught, but their perceived entry competence level is usually low and the exit level high. For example, for Inverse of the quadratic function, entry and exit means are 0.2 and 2.5. For several topics exit levels are above 3. Examples are Maxima and minima (3.0) and Quadratic equation problems (3.4). Thus improvements of 2 or more scale points are recorded for 11 of the 12 topics in this area, the greatest difference being for Theory of quadratic equations (0.1, 3.1). The mean entry and exit competence levels for the area as a whole are 0.5 and 2.9, an improvement of 2.4 points.

Similar comments apply to the area of Exponential and logarithmic functions. There is less emphasis on Analytical geometry where lower percentages of teachers teach the topics: 14 percent or more teach 7 of the 15 topics and the range of entry levels is from 0.4 for Tangents to a circle to 2.3 for Derivation of various forms of the equation.

The overall distribution of responses, giving means and standard deviations for all 11 areas, is shown in Table 7.15. This shows that the topic areas emphasized most are those already discussed (Basic algebra and the various types of Functions). The range of improvement for specific areas varies from 0.7 for Basic arithmetic to 2.4 for Quadratic exponential and logarithmic functions. Exit levels go from 2.0 to 3.1. The mean entry and exit levels for this course as a whole are 1.1 and 2.7, a difference of 1.6. The corresponding entry and exit levels for mathématiques for year 4 general and advanced appear in Tables 7.14 and 7.15. Levels on the whole are comparable with mathematics, although in Geometry, exit levels are clearly higher.

(iii) Competence Levels for Mathematics Topics Taught By High Percentages of Teachers in Year 4 General

Table 7.16 shows all topics (12) taught by more than 70 percent of the mathematics teachers. These topics belong mainly to the earlier sections of the questionnaire list, indicating a strong emphasis on Basic arithmetic, Basic algebra, and Trigonometry, complex numbers and statics. Mean entry levels for basic topics, (e.g., topics I.1, III.2, III.14) are high (2 or more) while those for new topics (IV.7, VI.1, and VI.3) are low (0.5 or less). Exit levels are relatively consistent, varying from 2.7 to 3.2, indicating the general level of competence expected for these topics.

TABLE 7.16

SECONDARY SCHOOL MATHEMATICS YEAR 4 GENERAL
ENTRY AND EXIT LEVELS OF COMPETENCE FOR
12 TOPICS TAUGHT BY 70 PERCENT OR MORE OF THE TEACHERS

Topic			No. Teaching Topic (N=50)	Entry		Exit		Improvement
				$\bar{X}$	SD	$\bar{X}$	SD	
I	1.	Fundamental arithmetic operations with fractions decimals, and integers	36	2.6	0.7	3.2	0.6	0.6
II	4.	Simple and compound interest	36	1.8	1.0	3.0	1.0	1.3
III	2.	Manipulating, simplifying and evaluating algebraic expressions	40	2.0	0.8	3.2	0.5	1.2
III*	9.	Factoring: various types, complex fractions	46	1.7	0.7	3.0	9.7	1.4
III	10.	Operations with rational algebraic fractions	39	1.4	0.9	2.8	0.9	1.4
III	14.	Four fundamental operations on polynomials	40	2.0	0.7	3.2	0.5	1.2
IV*	7.	Quadratic equations completing the square, formula, problems	42	0.5	0.7	2.8	0.6	2.3
V*	1.	Exponents: whole numbers, integers, rationals	41	1.7	0.7	3.1	0.7	1.3
V	8.	Computations with logarithms	39	0.5	0.8	3.1	0.7	2.6
VI*	1.	Sequences: definitions, general terms, graphs, limits	43	0.2	0.5	2.7	0.7	2.6
VI*	3.	Series: definitions, notation, first n terms.	41	0.2	0.5	2.7	0.7	2.5
IX*	1.	Primary and reciprocal trigonometric functions (definitions, graphs, properties)	35	1.6	0.9	3.1	0.6	1.5

*Topic also taught by 50 percent or more mathématiques teachers.

Mean entry and exit levels for all 12 topics are 1.4 and 2.9 respectively. The figures represent an average improvement of 1.6 scale points which is rather greater than for the course as a whole (1.2) This analysis complements that relating to core and supplementary topics.

Table 7.17 shows the 11 topics that were taught by more than 50 percent of mathématiques teachers. Spread throughout the major topic areas, these topics are nearly all core or supplementary according to the Ministry guidelines. The entry levels of competence are 1.0 or less for 7 of them and substantially above 1.0 for only 2 topics. Exit levels are typically 2.0 or more scale points higher than entry levels with one exit level, for the first topic under Exponential and logarithmic functions, reaching a high of 3.8. The mean entry and exit levels for the data are 0.8 and 2.9 respectively, indicating a mean improvement in competence of 2.1

Comparison of Tables 7.16 and 7.17 shows that 7 topics appear in both. All 7 are listed as either core or supplementary in the Ministry guidelines and they seem to be, in the veiw of the teachers, those topics which comprise the minimum core of year 4 mathematics courses at the present time.

Year 5

(a) Time Allocations

Table 7.18 gives the mean percentage times and standard deviations for Relations and Functions. The standard deviations are generally low in comparison with the means, indicating a fairly compact distribution with little variability in the time allocation. Regular topics received the most time proportionately (mathematics, 84 percent of total time; mathématiques, 93 percent). Common topics* received 11 percent of the time in mathematics and 4 percent in mathématiques courses.

Table 7.19 lists the appropriate means (and standard deviations) for time allocations for year 5 Calculus. The 15 topics listed as Elementary received a total mean time allocation of just over 60 percent, with most topics receiving between 3 and 6 percent. "Advanced" topics in Differentiation and Integration were equally emphasized to account for another 25 to 30 percent. Other "Advanced calculus" topics received an average of 5.5 percent and Common topics 3.1 percent. Standard deviations were at times comparable in size with mean times indicating a fair

*Common topics are ones listed in year 5 Ministry guidelines as suitable for optional inclusion in any of the three regular year 5 courses.

TABLE 7.17

SECONDARY SCHOOL MATHEMATIQUES YEAR 4 GENERAL
ENTRY AND EXIT LEVELS OF COMPETENCE FOR
11 TOPICS RATED BY 50 PERCENT OR MORE OF THE TEACHERS

Topic		No. Teaching Topic	No. Rating Topic	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD	Improvement
I	4. Simple and compound interest	7	7	1.0	0.6	3.1	0.4	2.1
*III	9. Factoring: various types, complex fractions	9	8	1.9	0.6	3.0	0.8	1.1
III	12. Operations with radicals and irrationals	8	8	1.1	0.6	2.8	0.5	1.7
*IV	7. Quadratic equations: completing the square, formula, problems	7	7	0.0	0.0	2.6	0.8	2.6
*V	1. Exponents: whole numbers, integers, rationals	9	9	1.8	0.8	3.1	3.8	1.3
V	7. Laws of logarithms	7	7	0.0	0.0	2.7	1.0	2.7
V	8. Computations with logarithms	8	8	0.0	0.0	2.9	0.8	2.9
*VI	1. Sequences: definitions, general terms, graphs, limits	7	7	0.3	0.5	2.6	1.1	2.3
*VI	3. Series: definitions, notation, first n terms	7	7	0.1	0.4	2.6	1.3	2.5
*IX	1. Primary and reciprocal trigonometric functions (definitions, graphs, properties)	8	8	1.0	0.8	2.8	0.5	1.8
*IX	9. Solution of right triangle	8	8	1.1	0.8	3.1	0.6	2.0

* Topic also taught by 70 percent or more mathematics teachers.

degree of variability in topic emphasis.

Corresponding topics and areas for year 5 Algebra, with the mean percentage times for each, are given in Table 7.20. Topics included in the Ministry guidelines as regular course topics accounted for a total mean percentage of about 75 percent, and Common topics for about 17 percent. The heaviest "mean time" emphases were on Vectors (25.3 percent), Sets (15.7 percent) and Mathematical induction (11.5 percent). Standard deviations for most individual topics were smaller than the means, indicating a fair degree of agreement among teachers about the time they spend on these topics.

Thus, the great bulk of time is allocated in Relations and Functions and Algebra year 5 courses to course or Common topics, only some 3 to 7 percent being devoted to other topics. Calculus exhibits the most variability in terms of standard deviations compared with means, and also in that Advanced calculus topics are allocated some 33 percent. Some of the topics concerned are fairly closely related to elementary topics and might be considered as extensions to them, but 10 percent would seem to be a generous time allocation for such topics. There is a definite tendency to teach topics in Calculus outside the Ministry guidelines. One possible explanation is that such topics are in the year 5 texts used. This hypothesis is supported by an examination of the content of one text used by a sizeable percentage of teachers.

(b) Teaching of Particular Topics

The percentages of year 5 teachers who teach specific topics in a given course were also calculated. Tables 7.18-7.20 present the percentages of teachers teaching their regular course topics in Relations and Functions, Calculus and Algebra respectively.

Eighty percent or more of the Relations and Functions teachers teach all of the 16 major Relations and Functions course topics.* Quite a few Common topics (mainly related to Matrices and linear transformations, and Mathematics of investment) as well as Probability and statistics topics were taught by 10 to 30 percent of the Relations and Functions teachers.

*Topic 17, Dilatation, was accidently omitted from the list. It was apparently taught by only 8 of the teachers who responded to the questionnaire.

TABLE 7.18

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5 RELATIONS AND FUNCTIONS
AVERAGE PERCENTAGE OF TIME ALLOCATED TO GROUPS OF TOPICS
AND PERCENTAGES OF TEACHERS TEACHING REGULAR COURSE TOPICS

Topic Area	Mathematics			Mathématiques		
	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Individual Topics $\bar{X}$	SD	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Individual Topics $\bar{X}$	SD[a]
A. Regular Topics						
Relations and Functions (Year 5)						
1. Function as a mapping.	88	3.2	2.0	100	5.5	
2. Inverse of a function.	92	2.6	1.2	100	3.3	
3. Graphs and properties of second degree relations using previously known skills.	88	5.1	2.9	100	5.0	
4. Equations and graphs of conics using focus-directrix definitions.	94	9.0	4.8	100	9.4	
5. Equations of conics in non-standard positions.	96	7.5	4.9	100	8.3	
6. Applications.	84	4.6	5.4	85	5.7	
7. Intersections of lines and conics; e.g., tangents.	92	5.4	2.6	100	4.1	
8. Intersections of conics and conics.	92	3.6	2.0	100	4.1	
9. Domain, range, and graph of basic trigonometric functions.	82	4.5	2.3	100	5.9	
10. Standard trigonometric formulae and applications.	90	9.0	5.0	100	8.3	
11. Trigonometric identity problems and equations.	92	5.7	2.6	100	6.6	

[a] Standard Deviation not available for French data.

TABLE 7.18 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5 RELATIONS AND FUNCTIONS
AVERAGE PERCENTAGE OF TIME ALLOCATED TO GROUPS OF TOPICS
AND PERCENTAGES OF TEACHERS TEACHING REGULAR COURSE TOPICS

Topic Area	Mathematics			Mathématiques	
	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Individual Topics X	SD	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Individual Topics X
12. Phase shift, period, and amplitude.	82	4.1	3.1	100	4.7
13. Translations of the plane.	96	5.1	2.6	100	7.2
14. Rotations of the plane.	94	5.9	3.2	100	6.4
15. Reflections of the plane.	94	3.1	1.9	92	3.0
16. Study of general conic.	80	5.7	4.4	92	5.3
OVERALL		84.1			92.8
B. Common Topics (Year 5)					
Matrices and linear transformations					
OVERALL		1.7			0.0
Polar coordinates					
OVERALL		0.8			0.0
Mathematics of Investment					
OVERALL		3.8			0.0
Statistics and Probability					
OVERALL		4.3			3.8
C. Other Topics					
Year 5		3.0			0.0
University		1.9			3.6
OVERALL		4.9			3.6
SUMMARY					
A. Regular Topics		84.1			92.8
B. Common Topics		11.0			3.8
C. Other Topics		4.9			3.6
		100.0			100.0

TABLE 7.19

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5 CALCULUS
AVERAGE PERCENTAGE OF TIME ALLOCATED TO GROUPS OF TOPICS
AND PERCENTAGES OF TEACHERS TEACHING REGULAR COURSE TOPICS

Calculus	Mathematics			Mathématiques		
	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics X	SD	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics X	SD[a]
A. Topics						
CALCULUS - Elementary Approach						
1. Limit of a function: intuitive approach via sequences and series.	100	5.7	3.7	75	5.9	
2. Rate of change: slopes, secants, tangents.	98	4.9	2.3	83	6.4	
3. Derivatives of powers, products, and quotients.	100	6.2	3.1	83	6.1	
4. Other derivatives: function of a function, trigonometric functions	98	5.5	3.2	83	5.9	
5. Applications of derivatives to tangents to curves.	100	3.0	1.4	83	3.2	
6. Further applications: velocity, acceleration.	98	5.6	2.5	83	6.4	
7. Second derivative and its use, curve tracing.	100	4.0	2.0	83	4.2	
8. Maxima and minima problems.	100	5.4	2.0	83	5.0	
9. Rate of change problems.	100	5.1	2.0	75	3.7	
10. Differential equations: anti-derivatives applied to curves and motion.	88	5.5	4.7	67	3.0	
11. Areas between curves and axes.	96	3.2	1.6	83	3.5	
12. Areas enclosed between curves.	94	2.7	1.5	83	2.3	

[a]Standard Deviation not available for French data.

TABLE 7.19 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5 CALCULUS
AVERAGE PERCENTAGE OF TIME ALLOCATED TO GROUPS OF TOPICS
AND PERCENTAGES OF TEACHERS TEACHING REGULAR COURSE TOPICS

Calculus	Mathematics			Mathématiques	
	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics X	SD	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics X
13. Volumes of rotation.	63	2.0	2.2	58	1.7
14. Integration using numerical methods.	43	1.0	1.6	42	1.7
15. Applications involving complex numbers and/or polar coordinates.	33	1.1	2.9	42	3.6
OVERALL		60.9			62.6
Derivatives					
26. Definition and algebra of derivatives.	71	1.7	2.0	58	1.7
27. Chain rule.	86	2.5	1.8	50	1.3
28. Derivatives of elementary functions	82	2.9	2.3	58	2.8
OVERALL		7.1			5.8
Applications of differentiation					
31. Related rates.	73	2.4	2.3	33	0.5
32. Optimization.	41	1.2	1.8	25	0.5
33. Graph sketching.	78	2.3	2.0	42	1.5
34. Scientific examples.	31	0.6	1.1	42	1.1
35. L'Hopital's Rule to limits	6	0.1	0.3	0	0.2
OVERALL		6.6			3.8

TABLE 7.19 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5 CALCULUS
AVERAGE PERCENTAGE OF TIME ALLOCATED TO GROUPS OF TOPICS
AND PERCENTAGES OF TEACHERS TEACHING REGULAR COURSE TOPICS

Calculus	Mathematics			Mathématiques	
	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics X	SD	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics X
Integration					
36. Definition of integral and algebraic integration.	61	1.8	2.6	67	2.2
37. Fundamental Theorem of calculus.	41	0.8	1.4	42	0.7
38. Mean value Theorem (MVT).	2	0.0	0.1	8	0.1
39. Application of MVT to approximation	2	0.0	0.2	8	0.1
OVERALL		2.6			3.2
Techniques of integration					
40. Substitution	67	2.2	3.0	33	1.0
41. Trigonometric substitution.	47	1.5	3.1	17	0.4
42. Parts.	47	1.0	1.3	42	1.1
43. Partial fractions.	47	1.0	1.2	33	0.9
OVERALL		5.7			3.4
Applications of Integration					
44. Area.	73	2.0	1.9	58	2.0
45. Volume.	49	1.1	1.4	33	0.9
46. Work.	18	0.2	0.5	17	0.5
47. Arc length.	22	0.2	0.4	8	0.1
48. Improper integrals.	6	0.1	0.8	17	0.5
49. Taylor's theorem.	6	0.1	0.4	0	0.0

TABLE 7.19 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5 CALCULUS
AVERAGE PERCENTAGE OF TIME ALLOCATED TO GROUPS OF TOPICS
AND PERCENTAGES OF TEACHERS TEACHING REGULAR COURSE TOPICS

Calculus	Mathematics			Mathématiques	
	% of Teachers Teaching Regular course Topics	Average % of Time Allocated to Groups of Topics X	SD	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics X
50. Logarithmic and exponential functions.	51	1.6	2.2	42	1.7
51. Hyperbolic function.	4	0.1	0.3	0	0.0
OVERALL		5.4			5.7
Other Advanced Approach Topics		5.5			6.1
B. Common Topics (Year 5)					
Complex Numbers OVERALL		1.3			4.5
Polar coordinates OVERALL		1.2			2.6
Statistics and Probability OVERALL		0.8			0.0
C. Other Topics					
Year 5					
University					
OVERALL		3.1			2.6
SUMMARY					
A. Regular Topics		93.4			90.6
B. Common Topics		3.3			7.1
C. Other Topics		3.1			2.6
OVERALL		99.8			100.3

TABLE 7.20

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5 ALGEBRA
AVERAGE PERCENTAGE OF TIME ALLOCATED
TO GROUPS OF TOPICS AND PERCENTAGES OF TEACHERS
TEACHING REGULAR COURSE TOPICS

Topic Area	Mathematics			Mathématiques		
	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics $\bar{X}$	SD	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics $\bar{X}$	SD[a]
A. REGULAR TOPICS						
ALGEBRA (Year 5)						
Sets, subsets						
1. Definition and laws of combinations	84	4.0	2.5	100	5.6	
2. Fundamental counting principles	84	2.7	1.9	90	2.9	
3. Permutations	88	4.4	2.2	100	5.8	
4. Combinations	83	4.5	2.4	100	5.3	
OVERALL		15.7			19.6	
Mathematical induction						
5. Method; use with properties of sigma notation	90	3.1	1.7	90	4.2	
6. Applications and counter-examples	92	3.0	1.3	90	3.	
7. Binomial theorem	90	5.4	2.3	90	5.3	
OVERALL		11.5			13.0	
Vectors						
8. Definition and properties	98	4.1	2.4	100	6.6	
9. Geometric uses	94	4.5	3.1	100	4.6	
10. Vectors as ordered pairs, ordered triplets	96	3.8	2.0	100	4.0	
11. Linear combinations of vectors	98	3.8	1.7	100	4.2	
12. Definition, formulae and algebraic properties of dot product	98	4.3	1.8	100	4.0	

[a] S.D. not available for French data

TABLE 7.20 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5 ALGEBRA
AVERAGE PERCENTAGE OF TIME ALLOCATED
TO GROUPS OF TOPICS AND PERCENTAGES OF TEACHERS
TEACHING REGULAR COURSE TOPICS

Topic Area	Mathematics			Mathématiques	
	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics $\bar{X}$	SD	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics $\bar{X}$
13. Projections, unit vectors, applications to physics	96	4.8	3.0	100	4.7
OVERALL		25.8			28.1
Equations of lines					
14. Vector and linear equations in 2-space	98	3.5	1.8	100	3.6
15. Vector and parametric equations in 3-space.	98	2.9	1.4	100	3.5
16. Direction angles, cosines, numbers	98			100	2.2
OVERALL		6.4			9.3
Equations of planes					
17. Vector, parametric, and linear equations in 3-space	98	3.8	1.5	100	4.7
18. Solution of sets of 2 or 3 linear equations	94	2.8	1.3	90	3.4
OVERALL		6.6			8.1
Systems of linear equations					
19. m equations in n unknowns	80	1.9	1.5	90	2.3
20. Augmented matrix; row reduced echelon form	88	2.6	1.4	90	3.1
21. Solutions in parametric form	84	1.7	1.3	90	1.7
22. Consistency and inconsistency	86	1.8	1.1	90	2.1
OVERALL		8.0			9.2

TABLE 7.20 (Cont'd)

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 5 ALGEBRA
AVERAGE PERCENTAGE OF TIME ALLOCATED
TO GROUPS OF TOPICS AND PERCENTAGES OF TEACHERS
TEACHING REGULAR COURSE TOPICS

Topic Area	Mathematics			Mathématiques	
	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics $\bar{X}$	SD	% of Teachers Teaching Regular Course Topics	Average % of Time Allocated to Groups of Topics $\bar{X}$
B. COMMON TOPICS (Year 5)					
Matrices and linear transformations					
OVERALL		6.7			7.8
Groups, rings and fields		1.7			
OVERALL					1.6
Complex numbers					
OVERALL		3.0			1.0
Polar coordinates					
OVERALL		1.3			0.0
Logical Reasoning					
OVERALL		1.1			1.2
Mathematics of Investment		0.0			0.3
Probability and Statistics		3.0			1.8
C. OTHER TOPICS		7.6			0.0
SUMMARY					
A. REGULAR TOPICS		75.7			87.3
B. COMMON TOPICS		16.8			13.7
C. OTHER TOPICS		7.6			
OVERALL		100.1			101.0

In the Calculus course, basic Calculus topics 1 to 12, were taught by 88 percent or more of the teachers, with various other topics such as Derivatives and Basic applications of differentiation (Related rates, sketching) as well as Integration and Basic applications of integration (Area, Volume) being taught by 40 to 80 percent of the Calculus teachers. Complex numbers and Polar coordinates were taught by about 20 to 25 percent of these teachers but only 2 to 4 percent of them taught any Probability topics.

All 22 of the Algebra topics listed in the questionnaire were taught by 80 percent or more of the Algebra teachers. Vectors, Equations of lines, and Equations of planes were taught by well over 90 percent of them. The main Common topics taught by Algebra teachers were Matrices and linear transformation (52-70 percent). Logical reasoning was taught by 14 to 18 percent of the teachers.

Percentages and topic emphases in year 5 Mathématiques are similar to those listed above for year 5 Mathematics courses. Nearly all regular Relations and Functions topics were taught by 100 percent of the Relations and Functions teachers. High percentages of teachers teach the first 12 Elementary Calculus topics; and sizeable percentages teach many of the subsequent Calculus topics, 12 of them being taught by over 40 percent. The percentages of algèbre teachers teaching all the 22 regular course topics are very high (90 to 100 percent). Percentages are similar to those of Algebra for Matrices topics, but smaller for other Common topics.

Thus, the focus for year 5 courses is strongly on the regular course topics, and there is a very similar pattern in both mathematics and mathématiques.

Tables 7.21-7.22 summarize the relevant data for year 5 courses. Nearly all those topics which, according to the Ministry, belong to the normal content of Relations and Functions, and Algebra courses, are taught by almost all of the respective course teachers sampled. In Relations and Functions, there is almost no variability in mathématiques and little in the mathematics courses. There is none in the teaching of Algebra topics. However, there is some variability in Elementary Calculus topics for both mathematics/mathématiques where 60 to 80 percent of the topics are taught by over 80 percent of the teachers. The variability is greatest in the

TABLE 7.21

SECONDARY SCHOOL MATHEMATICS YEAR 5
NUMBER OF TOPICS TAUGHT BY PERCENTAGE RANGES OF TEACHERS

Topic Area	% Ranges of Teachers																	
	Relations & Functions						Calculus						Algebra					
	0%	1-20	21-40	41-60	61-80	81+	0%	1-20	21-40	41-60	61-80	81+	0%	1-20	21-40	41-60	61-80	81+
I Relations & Functions (16)[a]					1	15		16						16				
II Calculus (64)	36	28					5	21	7	10	7	14	30	34				
III Algebra (22)	13	9					15	7									1	21
IV Some Common topics (21)	5	13	3				13	4	4				4	7	7	2	1	
V Foundations general algebra (44)	38	6					39	5					23	21				
VI Linear algebra (33)	26	7					33						13	20				
VII Probability and Statistics (37)	23	11	3				22	15					26	8	3			

[a]Number of subtopics within each topic area.

TABLE 7.22

SECONDARY SCHOOL MATHEMATIQUES YEAR 5
NUMBER OF TOPICS TAUGHT BY PERCENTAGE RANGES OF TEACHERS

Topic Area	% Ranges of Teachers: Relations and Functions 0%	1-20	21-40	41-60	61-80	81+	Calculus 0%	1-20	21-40	41-60	61-80	81+	Algebra 0%	1-20	21-40	41-60	61-80	81+
I Relations and Functions (16)[a]						16	14	2					16					
II Calculus (64)	64						12	18	8	13	4	9	64					
III Algebra (22)	20	2					22											22
IV Some Common topics (21)	15	6					15		3	3			5	13			3	
V Foundations general algebra (44)	39	6					44						44					
VI Linear algebra (33)	33						33						33					
VII Probability and Statistics (37)	26	4	5				37						34	3				

[a]Number of subtopics within each topic area

case of the advanced topics. Not many Common topics receive much weight; most of them (about 75 percent in Relations and Functions courses, about 80 percent in Calculus, and over 60 percent in Algebra courses) are taught by fewer than 20 percent of the teachers. A few topics are taught by over 40 percent of the Calculus teachers and by over 65 percent of the Algebra teachers.

(c) Student Achievement at Entry and Exit

This discussion applies to mathematics courses only.

Relations and Functions (N=49). Entry levels for the 16 regular topics listed vary from 0.1 for Equations and graphs of conics using focus-directrix definitions to 1.8 for Function as a mapping. Exit levels for these are 3.2 and 3.3 and the exit level is 3 or more for 15 of the 16 topics. The overall means for the group are 0.9 (entry) and 3.2 (exit), a difference of 2.3.

Only a few Common topics are taught by more than a few teachers. These include the three Matrices topics and three Mathematics of investment topics. Entry and exit levels are comparable with those for the regular topics with all exit levels above 3.

When all teacher responses are included, the "grand" mean entry and exit levels are 0.8 and 3.2 respectively indicating an improvement of 2.4.

Calculus. Entry levels for practically all topics are seen as very low, the highest for the 15 "basic approach" topics being 0.9 for Rate of change. For 11 of the 15, the exit competency level is 3 or over. Numerical integration, and Applications of complex numbers, taught by 43 percent and 33 percent of the 51 teachers respectively show lower exit levels than the other topics (1.6 and 1.7). The topic with the highest exit level (and improvement) is Derivatives of powers (0.0, 3.7).

The "advanced approach" topics taught by 35 percent or more teachers are 8 in number (Definition and algebra of limits; Chain rule; Derivatives of elementary functions; Related rates; Graph sketching; Definition of integral and algebraic integration; Substitution as a technique of integration and Applications of integration-area). These show similar low entry (near 0.0) and quite high (about 3) exit levels.

There seems to be a general consistency of entry and exit levels for Calculus. The mean entry and exit levels for the Elementary calculus topics are 0.2 and 2.9; for all 64 Calculus topics they are 0.2 and 2.3; and the grand means, taking all teachers' responses into account, are 0.2 and 2.4. Thus, the mean improvement for Elementary topics is 2.7, as opposed to an overall mean improvement of 2.2.

Algebra (N=50). Entry and exit levels for individual topics are quite similar to those for year 5 Calculus. Only two entry levels for the 22 listed topics in the Algebra year 5 section exceed 1.0. They are Definitions and laws of combination of sets (1.1) and Definition and properties of vectors (1.1). Exit levels for these are 3.2 and 3.7 respectively. The overall entry level for this set of topics is 0.4 and the overall exit level is 3.3 indicating an improvement of 2.9.

Common topics are taught by varying numbers of Algebra teachers. The only ones taught by 50 percent or more are the first three topics on the Matrices. For them entry and exit levels are 0.2, 3.3; 0.3, 2.9 and 0.1, 2.9.

Year 5 courses are characterized by perceptions of low entry levels and quite high exit levels of student competence for the great majority of topics taught. Overall exit levels are about 3 on the scale for the Relations and Functions and Algebra courses, but about 2.4 in the case of Calculus. It is clear that this mean has been depressed somewhat by the competence exit levels assigned to Advanced approach topics.

The mean improvements in competency for the three courses are 2.4 (Relations and Functions), 2.2 (Calculus), and 2.8 (Algebra).

3. *TEACHING METHODS*

(a) *Instructional Techniques*

Time did not allow detailed study of the data for the 10 secondary school courses. Illustrative tables for the year 4 general courses, and for the year 5 courses are given. Patterns for other year 4 courses are generally quite similar.

Socratic interaction, and classroom study are the two most widely used instructional techniques in both mathematics year 4 courses. For example, 60 percent of year 4 general and 73 percent of year 4 advanced teachers used the Socratic approach or above 30 percent of the in-class time. Corresponding figures for classroom study were 32 percent and 21 percent. Individualized instruction was used for more than 75 percent of the time in 2 year 4 general courses and for 4 advanced courses. Table 7.23 shows the overall distribution for the year 4 general course.

Socratic interaction was again the most widely used method in year 5 in all three courses. There was, however, emphasis on the lecture method, about 15 to 25 percent of the teachers using it above 30 percent of the time. The actual distributions of responses for year 5 mathematics courses are given in Table 7.24 and for year 5 mathématiques courses in Table 7.25.

In mathématiques, the pattern is, in general, similar. Yet in year 4 mathématiques there is an almost equal emphasis on lecture and Socratic method, while at year 5 the emphasis on lecturing is more pronounced (see Tables 7.23 and 7.25).

(b) Out-of-Class Work

For year 4 general courses, the majority of teachers (70 percent or more), do not expect students to spend more than half an hour on homework for every hour in class. At advanced level, the expectations are higher and 50 percent of teachers expect between three-quarters of an hour and an hour.

The modal expectation for homework in the 6 year 5 courses (both mathematics and mathématiques) is three-quarters of an hour to an hour. Calcul teachers' expectations are higher, since 26 percent of them want an hour to an hour and a half. Expectations of mathématiques teachers are, in general, higher than mathematics teachers. Relevant tables are provided in Volume 2.

(c) Provision for Individual Progress

Mathematics/mathématiques courses in both years 4 and 5 only allow individual progress to a small extent, according to the responses given. There

TABLE 7.23

SECONDARY SCHOOL MATHEMATICS/MATHEMATIQUES YEAR 4 GENERAL TEACHING METHODS

Method	% of Teachers Using for % Range of Time								
	Mathematics				Mathématiques				
	0-10%	11-20%	21-40%	41%+	0%	1-10%	11-20%	21-40%	41%+
Lecture	55%	21%	21%	3%	15%	15%	23%	15%	31%
Socratic	6	15	36	43	15	54		16	15
Practically-oriented work	95	5			31	38	23	8	
Small group activities	92	4	4		23	38	8	31	
Seminar, tutorial	66	17	17		84	8	8		
Classroom study	33	13	31	23	23	15	38	16	8
Individualized instruction	64	9	9	18	54	46			
Testing	76	20	4		15	70	15		
Audiovisual	100				77	23			
Other	33	33	33						

TABLE 7.24

SECONDARY SCHOOL MATHEMATICS YEAR 5
TEACHING METHODS

Method	% of Teachers Using % Range of Time											
	Relations & Functions				Calculus				Algebra			
	0-10%	11-20%	21-40%	41+%	0-10%	11-20%	21-40%	41+%	0-10%	11-20%	21-40%	41+%
Lecture	49%	33%	13%	5%	39%	25%	27%	9%	47%	13%	23%	17%
Socratic	6	8	30	56	10	12	18	60	8	14	34	44
Practically-oriented work	100				71	29			92	8		
Small group activities	92	4	4		94		6		94	6		
Seminar, tutorial	71	21	7		86	7	7		93	7		
Classroom study	44	16	21	19	39	20	32	9	33	23	32	12
Individualized instruction	100				100				67	33		
Testing	88	12			88	12			82	18		
Audiovisual	100				100				100			
Other		100			80			20	100			

TABLE 7.25

SECONDARY SCHOOL MATHEMATIQUES YEAR 5
TEACHING METHODS

Method	% of Teachers Using % Range of Time														
	Relations & Functions					Calculus					Algebra				
	0%	1-10%	11-20%	21-40%	41+%	0%	1-10%	11-20%	21-40%	41+%	0%	1-10%	11-20%	21-40%	41+%
Lecture	8%	8%	23%	23%	38%	8%	17%	8%	42%	25%			27%	28%	45%
Socratic		23	15	38	23	25	17	8	42	8		55		45	
Practically-oriented work	61	31		8		58	25		17		73	9	9	9	
Small group activities	31	38	23		8	50	33	17			55	36	9		
Seminar, tutorial	84	8	8			83	17				73	27			
Classroom study	15	46	23	8	8	17	17	25	34	8	9	27	27	27	9
Individualized instruction	100					92	8				91	9			
Testing	8	92					83	17			9	82	9		
Audiovisual	85	15				67	33				82	18			
Other						92	8				82	18			

is apparently slightly more provision made in year 4 especially in the general course, but even there, 62 percent of the mathematics courses and 85 percent of the mathématiques courses have no provision. In general, there tends to be rather less provision for individual progress in mathématiques courses than in mathematics.

(d) Time Allocation for Review

Respondents to the questionnaire were also asked to state the percentage of total course time spent in review. In year 4, these figures were high. Thus 48 percent of mathematics teachers and 5 of 6 mathématiques ones spent between 10 and 40 percent of the total class time on review. The times for year 4 advanced courses were less but still sizeable, while for year 5 courses, the time for most teachers was less than 10 percent.

(e) Teaching Resources

In all year 4 courses the resources most used are the main text and mimeographed materials. Other resources are used very infrequently, the only ones of note at all being supplementary texts, and to a very limited extent, individualized learning packages.

The same emphasis is to be found in year 5 courses. Year 5 teachers in Calculus and Algebra use supplementary texts and mimeographed materials to a smaller extent than year 4 teachers and Relations and Functions teachers use these resources even less. Data showing the total use of resources is given in Tables 7.26-7.29.

An analysis of the responses to a question in the survey questionnaire asking for details of textbooks used by each teacher yielded the following information. For year 4 general, 53 respondents listed texts, all Canadian. One text was used by 15 teachers, another by 9, a third by 8, and there were 10 other texts in use. All but one, which was Board-prepared, were commercially produced, while 34 had been published in or since 1970. For year 4 advanced, 50 respondents listed texts, again all Canadian; 34 teachers used one specific text, and 6 a second one. Only 4 other texts were in use. The two widely used texts were recent (1970 or later); the rest were pre-1970.

TABLE 7.26

SECONDARY SCHOOL MATHEMATICS YEAR 4
TEACHING RESOURCES

Resource	Use by % of Teachers							
	General				Advanced			
	Not at All	Small Extent	Moderate Extent	Great Extent	Not at All	Small Extent	Moderate Extent	Great Extent
Main text	4%	8%	26%	62%		2%	12%	86%
Main text plus supplementary text(s)	51	32	13	4	69	17	7	7
Two or more main texts or materials from other texts	73	9	7	11	74	14	7	5
Mimeographed materials (lecture notes, etc.)	12	34	28	26	12	43	25	20
Reference books, dictionaries, encyclopedias, etc.	83	15	2		78	18	4	
Individualized learning packages	80	13		7	94		4	2
Laboratory and/or computer equipment	87	13			92	6	2	
Audiovisual media (television, tapes, film, etc.)	83	17			88	12		
Other	94	2	2	2	96	2	2	

TABLE 7.27

SECONDARY SCHOOL MATHEMATIQUES YEAR 4
TEACHING RESOURCES

Resource	Use by % of Teachers							
	General				Advanced			
	Not at all	Small extent	Moderate extent	Great extent	Not at all	Small extent	Moderate extent	Great extent
Main text	8%	23%	23%	46%			14%	86%
Main text plus supplementary text(s)	15	23	23	39	57	29	14	
Two or more main texts or materials from other texts	69	8	8	15	86	14		
Mimeographed materials (lecture notes, etc.)	8	38	16	38		50	36	14
Reference books, dictionaries, encyclopedias, etc.	54	38			72	21	7	
Individualized learning packages	77	15	8		86	7		7
Laboratory and/or computer equipment	61	31	8		93	7		
Audiovisual media (television, tapes, film, etc.)	77	23			64	29	7	
Other	100				77	8	15	

TABLE 7.28

SECONDARY SCHOOL MATHEMATICS YEAR 5
TEACHING RESOURCES

Resource	Use by % of Teachers											
	Relations & Functions				Calculus				Algebra			
	Not at All	Small Extent	Moderate Extent	Great Extent	Not at All	Small Extent	Moderate Extent	Great Extent	Not at All	Small Extent	Moderate Extent	Great Extent
Main text		4%	16%	80%		4%	16%	80%	6%	4%	4%	86%
Main text plus supplementary text(s)	39	39	15	7	32%	38	18	12	33	47	10	10
Two or more main texts or materials from other texts	76	13	9	2	52	17	19	12	72	17	9	2
Mimeographed materials (lecture notes, etc.)	16	49	35		12	31	45	12	26	36	24	14
Reference books, dictionaries encyclopedias, etc.	59	39	2		65	33	2		60	36	4	
Individualized learning packages	94	4	2		96	4			90	4	4	2
Laboratory and/or computer equipment	89	9	2		90	6	2	2	92	8		
Audiovisual media (television, tapes, film, etc.)	84	10	6		84	14	2		86	14		
Other	91	4		4	98	2			96		2	2

TABLE 7.29

SECONDARY SCHOOL MATHEMATIQUES YEAR 5
TEACHING RESOURCES

Resource	Use by % of Teachers											
	Relations & Functions				Calculus				Algebra			
	Not at All	Small Extent	Moderate Extent	Great Extent	Not at All	Small Extent	Moderate Extent	Great Extent	Not at All	Small Extent	Moderate Extent	Great Extent
Main text				100%			10%	90%			18%	82%
Main text plus supplementary text(s)	73%	18%	9%		51%	37%		12	46%	27%	27	
Two or more main texts or materials from other texts	81	9	9		56	44			70	20	10	
Mimeographed materials (lecture notes) etc.	23	31	38	8	18	46	36		27	27	37	9
Reference book, dictionaries, encyclopedias etc.	46	54			60	20	20		73		18	9
Individualized learning packages	88	12			90	10			100			
Laboratory and/or computer equipment	80	20			90	10			91	9		
Audiovisual media (television tapes, film, etc.)	84	8	8		90	10			73	18	9	

All year 5 texts cited were of Canadian origin. Of 57 Relations and Functions respondents, 23 used one, and 20 a second. There were 12 different texts in all, 8 of them (including the 2 popular ones) published since 1970.

In Algebra, 10 different texts were used, with one used by 23 and another by 13 teachers. These and others were 1970 or later publications.

4. *ASSESSMENT OF STUDENT WORK*

(a) *Exemptions from Final Examinations*

Teachers were asked to state whether exemption from a final examination was possible in the course, and, if so, under what conditions.

Responses indicated that 10 percent of year 4 mathematics courses and 38 percent and 14 percent, respectively, of general and advanced mathématiques courses had no final examinations, while for the remainder exemption was possible for sizeable percentages (66 percent mathematics, 40 percent mathématiques). Between 30 and 40 percent of teachers required at least 60 percent on term work before granting exemption. A small percentage of mathematics teachers (4 percent general, 18 percent advanced) indicated that a teacher's recommendation was also needed. Another interesting condition listed was "less than 20 days absence from class".

Responses for all 6 year 5 courses are very similar to those for year 4. Tables 7.30 through 7.33 show the responses of teachers when asked to estimate percentages of the students' final mark allocated to various categories of evaluation.

When final examinations are used in year 4 courses, typically they count for 20 to 40 percent of the students' final mark. Problems and exercises also form part of the final mark, although they appear to be used more in general courses. Usually the weight does not exceed 30 percent.

Profiles of assessment are, in general, very similar for both year 4 Mathematics courses. The final mark tends to be based on written tests, mid-term examinations and final examinations. Written tests are used by all teachers, with percentage weights typically 50 percent,

TABLE 7.30

SECONDARY SCHOOL MATHEMATICS YEAR 4
FINAL MARK ALLOCATION

Item	Allocation of Final Mark (By % Ranges)													
	General							Advanced						
	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51+	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51+
Final examination			18%	36%	46%					10%	40%	30%	20%	
Mid-term examination(s)		7	23	20	37	13				23	13	46	18	
Other oral tests		50	50					100						
Individual papers (essays, reports, etc.)		70	20		10				80	20				
Other written tests			2	12	18	20	48				2	17	21	60
Individual projects (e.g., oral presentations)		78	22						100					
Group or team papers, projects		100							100					
Problems, exercises		74	4	14	4	4			90	5	5			
Notebooks		90	10						80	20				
Laboratory and/or other class participation		82	18						100					
Effort		80	20						90	5	5			
Attendance		100							100					

[a] When respondents indicated that students could be exempted from their final examinations, the final mark allocation was determined by excluding marks assigned for the final examination. When all students were required to write the final examination it was included in the final mark allocation.

TABLE 7.31

SECONDARY SCHOOL MATHEMATIQUES YEAR 4
FINAL MARK ALLOCATION[a]

Item	Allocation of Final Mark (By % Ranges) General							Advanced						
	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51+%	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51+%
Final examination	38%		23%	16%	23%			29%	7%	29%	21%	14%		
Mid-term examinations(s)	54		23		15		8	43	7	21	21	7		
Other oral tests	100							86	14					
Individual papers (essays, reports, etc.)	77	23						91	9					
Other written tests			8		31	23	38		7		7	7	14	65
Individual projects (e.g., oral presentations)	77	23						72	21	7				
Group or team papers, projects	85	15						79	21					
Problems, exercises	23	46	23		8			57	36			7		
Notebooks	69	31						86	7	7				
Laboratory and/or other class participation	77	23						86	14					
Effort	85	15						86	14					
Attendance	92	8						91	9					

[a] When respondents indicated that students could be exempted from their final examinations, the final mark allocation was determined by excluding marks assigned for the final examination. When all students were required to write the final examination it was included in the final mark allocation.

TABLE 7.32

SECONDARY SCHOOL MATHEMATICS YEAR 5
FINAL MARK ALLOCATION

Item	Allocation of Final Mark (By % Ranges)																				
	Relations & Functions							Calculus							Algebra						
	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51+	0	1-10%	11-20%	21-30%	31-40%	41-50%	51+	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51+
Final examination*			10%	50%	20%	20%				15%	54%	15%	15%			8%	8%	51%	25%	8%	
Mid-term examination(s)		2	25	20	40	13			2	25	21	31	15	6		2	17	17	45	14	5
Other written tests				14	16	25	45			4	4	16	16	60			2	10	10	24	54
Other oral tests		50	50						100							100					
Individual papers (essays, reports etc.)		80	20						100							92	8				
Individual projects (e.g., oral presentations)		89		11					67	33						100					
Group or team papers, projects		100							100							75	25				
Problems, exercises		76	24						100							87	13				
Notebooks		100							100							100					
Laboratory and/or other class participation		100							75	25						100					
Effort		92	8						100							100					
Attendance		100							100							100					
Other		100							100							100					

*When respondents indicated that students could be exempted from their final examinations, the final mark allocation was determined by excluding marks assigned for the final examination. When all students were required to write the final examination it was included in the final mark allocation.

TABLE 7.33

SECONDARY SCHOOL MATHEMATIQUES YEAR 5
FINAL MARK ALLOCATION

Allocation of Final Mark (By % Ranges)

Item	Relations & Functions 0%	1-10%	11-20%	21-30%	31-40%	41-50%	51+
Final examination*	31%		46%	8%	15%		
Mid-term examination(s)	39		15	31	15		
Other written tests				15		23%	62%
Other oral tests	92	8					
Individual papers (essays, reports etc.)	69	23	8				
Individual projects (e.g., oral presentations)	85	15					
Group or team papers, projects	69	23	8				
Problems, exercises	85	15					
Notebooks	92	8					
Laboratory and/or other class participation	92	8					
Effort	92	8					

Item	Calculus 0	1-10%	11-20%	21-30%	31-40%	41-50%	51+
Final examination*	9%	9%	46%	9%	27%		
Mid-term examination(s)	46		27	9	18		
Other written tests			9		18	9%	64%
Other oral tests	100						
Individual papers (essays, reports etc.)	91	9					
Individual projects (e.g., oral presentations)	91	9					
Group or team papers, projects	100						
Problems, exercises	64	27	9				
Notebooks	91	9					
Laboratory and/or other class participation	91	9					
Effort	91	9					

Item	Algebra 0	1-10%	11-20%	21-30%	31-40%	41-50%	51+
Final examination*	46%		27%	9%	18%		
Mid-term examination(s)	36		9	36	18		
Other written tests			18	18		9%	54%
Other oral tests	91	9					
Individual papers (essays, reports etc.)	64	27	9				
Individual projects (e.g., oral presentations)	82	9	9				
Group or team papers, projects	91	9					
Problems, exercises	55	36	9				
Notebooks	91	9					
Laboratory and/or other class participation	82	18					
Effort	73	27					

*When respondents indicated that students could be exempted from their final examinations, the final mark allocation was determined by excluding marks assigned for the final examination. When all students were required to write the final examination it was included in the final mark allocation.

although they vary between 15 percent and 60 percent (or sometimes even 75 percent).

The profiles of assessment categories and weights are much the same for the year 5 courses. Generally speaking, more weight is placed on final examinations when they are used. Written tests seem to carry most weight in Relations and Functions.

The emphasis implied by these tables is supported strongly by interview data from a group of 14 department heads. All indicated that in their department there was some emphasis on "term work". Emphasis varied from "continuous evaluation" with no final examination, to courses in which the final examination counted for 15 to 70 percent of the final mark.

There is thus quite an amount of variability in the way final course marks are awarded. In one of the 14 schools there is a 50-50 split between term work and final examination in Term 1, while in Term 2, no final examination is required if the student's average over both terms is 60 percent or better.

The justification given for emphasis upon written tests is that there is an increase in motivation if there is a test after every chapter in the text. On the other hand, 3 of the 14 department heads thought that there was emphasis on final examinations in order to encourage students to study more seriously and to prepare them better for university.

(b) Pattern of Assigned Marks; Standards

Nine of the 14 department heads interviewed stated that patterns had changed, mainly in the direction of awarding higher marks, and toward fewer failures. The remaining 5 felt standards were about the same. Some interesting comments on higher marks are worth repeating:

> "Since final examinations cover only the previous term, there is no need for review of the whole year's work, hence not as much volume to remember."

> "Most students continue to grade 13 and the students having difficulty drop out. Hence marks remain high."

> "Average work is given 60 to 70 percent as this improves the student's motivation. Students don't like to receive low marks; students expect higher marks."

Several respondents also felt that standards were gradually tightening up again after a period of generally lower standards.

Finally, there seemed to be a feeling that the spectrum of student ability had broadened, that the "good" students were at least as good if not better, and that it was in the earlier grades (below year 5) that weaknesses particularly in "basics", were evident.

(c) Correlations between Course Outlines and Final Examinations

Each school sampled was asked to provide course outlines and term and/or final examinations for the 5 mathematics courses studied. There was nearly 100 percent response to the request from English-speaking schools although a cursory inspection of the materials revealed a good deal of variation; some schools sent no examinations and and some course outlines lacked detailed information. It was not possible to analyze data from Francophone schools.

A random sample of 10 English-speaking schools was chosen for further analysis, and subsequent checking indicated that the subsample was, indeed, representative of the parent sample of schools.

There was an overall response rate of 70 percent for course outline materials and of 78 percent for evaluation materials, with individual response rates varying from between 30 percent and 70 percent for both sets of materials for the 5 courses under study.

Year 4 General

Analysis was based on data for 7 of the 10 schools. A checklist, designed to show which of the 145 topics listed in the questionnaire were taught in each school, revealed that some 60 topics were taught, greatest emphasis being on topics in Basic algebra and Trigonometry. In some cases, only a few topics were taught.

Of the 14 topics in the questionnaire described as core in the Ministry guidelines, 10 were taught; of these 10, only 2 (III.9, Factoring: various types, complex fractions; IV.7, Quadratic equations: completing the square, formula, problems) were taught in all 7 schools, and an additional 4 were taught in only 4 or 5 schools. In fact, only 21 of the 145 topics listed in the questionnaire were taught in 4 or more of the 7 schools, and only 8 (4 of which are core and 3 supplementary topics) were taught by 70 percent or more of the year 4 general teachers sampled.

Examinations, which were received from 5 of the 7 schools, were scrutinized and a list was compiled of those topics which were tested. As might be expected, there was considerable variation when the lists of topics taught and topics tested were compared. There was a total of 69 evaluations against 199 topics, indicating that 35 percent of the topics taught were, in fact, tested. The result is a reasonable one, however, in light of the considerable variation in the evaluation policies of the schools involved. One school evaluated on the basis of 9 tests; in contrast, one held examinations at the end of each of 3 terms. Four schools, including the latter school mentioned, held final June examinations.

Year 4 Advanced

Fifty-six topics were taught, 30 of them by 4 or more of the 7 schools on which the data were based. Most emphasis was placed on sections IV, Quadratic functions and equations (8 out of 12 topics); V, Exponential and logarithmic functions (5 out of 14 topics); VI, Sequences and series (4 out of 5 topics); and IX, Trigonometry, complex numbers, and statics (4 out of 18 topics). This agrees well with the major topics listed in the Ministry guidelines and with the responses from the questionnaire.

Based on data from 6 of the schools, it appears that about 45 percent of the topics taught (or 94 out of 210 topics) were evaluated. Occasionally, items not listed on the course outlines were evaluated, perhaps indicating that additional work had been covered in given topic areas where learning had progressed faster than had been anticipated originally. Three of the 6 schools held only final June examinations; 2 of them held one examination at the end of the second term; and the sixth relied exclusively on 9 tests, which included "term tests".

Year 5 Relations and Functions

For Relations and Functions, 5 sets of course outline materials were received, 2 of which gave time allocations for the topics. One of the remaining three used an integrated approach in year 5 so it is not considered in the present discussion. The only course topic listed in the survey questionnaire that was not taught by any of the four schools was Applications of conics.

Intersection of conics with conics was taught in two of the four schools and Trigonometric identity problems and equations was taught in three. All other topics were taught in each of the schools. Eight other topics (4 of them Common topics) were also taught, including Dilatations in three schools, and Statistics and Logic by two apiece. Time allocations for the two schools providing them were similar in the main, with a few divergences. One school spent 9 percent of its time on Statistics and the other spent 12 percent and 7 percent on Matrices and on Polar coordinates respectively.

Comparison of these two time allocations with those for the teachers sampled indicates a reasonable correspondence in all but one topic, Second degree relations. Double to triple the time was spent on this topic in the two schools compared with the mean time for the teachers sampled. However, the topic was specified as "review" by the teachers concerned.

Examination data were available for only 3 of the 4 schools. Of the total 45 topics listed as taught by the three schools as a group, only 9 (20 percent) were not evaluated. Three of these were introductory topics which could be examined when topics dependent on them were tested. Evaluation policies differed, but all four schools held a final examination; two of them held a second earlier examination; one held a series of tests; and the fourth relied entirely on the final examination.

Year 5 Calculus

Six course outlines were analyzed, 2 of which provided time allocations. Twenty-seven topics were taught in all; 14 of them were Elementary approaches, 9 were Advanced approaches, and 3 were Common topics. Eleven of the 15 Elementary approach topics were taught in all 6 schools, 2 taught in 5 schools, Volumes of revolution was presented in only one school. Application of complex numbers or Polar coordinates (III.15) figured as two of the three Common topics, with Matrices as the other. The advanced topics comprised 5 basic topics in Differentiation (questionnaire nos. 26, 27, 28, 31, 33), 2 in Integration (nos. 36, 50) and 1 in Power series (no. 56).

The topic time allocations for the two schools providing them were similar in general. Both spent some time (9 percent and 5 percent) on Advanced Approach topics, both treating Definition of derivative, and the Chain rule. Comparison of the time allocations with the "mean" ones derived from the overall sampling showed general correspondence. Two other points are worth noting. At the beginning of the course the times allocated by the two schools in question are considerably above the mean time in the total of 50 courses sampled. Thus, about 30 percent of total class time is allocated in each of the schools to the first three Calculus topics, as compared with about 17 percent in the sample as a whole. The variability of incoming students and the need for review may again be the reason for such a large time allocation. Secondly, the total mean time allocated to Advanced Approach topics was comparable to the mean time for the sample (about 30 percent).

Evaluation of topics approached 100 percent for three of the four schools, with the fourth evaluating only 8 of the 20 topics covered. However, this is consistent with the school evaluation policies, since the first three schools all held final examinations in June, whereas the fourth held only one examination in March.

Year 5 Algebra

Five schools submitted course outlines and all 5 also submitted sets of materials on evaluation, one of which included time allocations to topics.

Three schools covered 17, one 18, and one all of the 22 topics listed in Section III of the questionnaire content matrix. Seven additional topics were studied varying from Probability to Linear programming. For the 5 schools, the minimum number of topics studied was 19 and the maximum was 25. Of the 22 regular topics, 19 were studied in all 5 schools, 2 in 4 schools and the remaining one (Application and counter-examples of mathematical induction) was studied in 2 schools.

Correspondence between the time allocations given in the one school's course outline was reasonably good when compared with those

of the sample, with most of the early topics getting time allocations that were heavier than the mean.

Evaluation of topics covered was almost 100 percent in two of the schools and about 70 percent, 40 percent, and 30 percent in the remaining three. For these three, the later topics were those not examined.

D. Discussion

1. *CONTENT COVERAGE*

In mathematics, content covered in a particular course is always related to content covered in previous courses. The degree of relationship will vary, depending on the area of study. Thus, the relationship between a course in Synthetic geometry and previous courses in Algebra will tend to be small, but the relationship between year 5 Relations and Functions and year 4 Foundations of Mathematics 2 should be high, since the year 5 content is essentially a continuation and development of that in year 4.

Achievement levels in previous courses and topics can also affect course content. A topic may have been taught, but the resulting achievement levels may not be adequate for the work of the succeeding course, thereby making it necessary to spend time on review, or in improving competency.

Some topics are taught in depth to an extent not stipulated by Ministry guidelines; this produces duplication with some university course content. Finally, some content supposed to have been covered may not have been so that a gap in knowledge and related skills is present, again requiring time to be allocated in order to remedy the gap.

All this assumes that coordination and communication across the course interface is such that these mismatches can be readily

identified and remedied - not an assumption which can easily be made.

It is quite clear from the data both from the questionnaire and from department heads, that student competencies as they enter both year 4 and year 5 courses, particularly year 4, vary enormously. There is a universal concern by teachers that "basic skills", presumably the ability to compute mathematically and carry out fundamental operations algebraically, are not adequate. Other independent data (for example, from Project II and the recent study by the Canadian Chamber of Commerce) confirm this view.

The consequences of this can be seen in the content coverage reported for year 4 general courses in particular, where some 40 percent of the mean time allocated is for topics supposedly learned prior to year 4. These topics, primarily early topics in Sections I (Basic arithmetic), II (Business arithmetic) and III (Basic algebra) have apparently not been mastered to the necessary degree by the majority of students. Similar comments apply less stringently to year 4 advanced, and to year 5 to a relatively minor degree. Data summarizing the degree of dissatisfaction with incoming competencies were given in Tables 7.2 and 7.3 . Usually the dissatisfaction is with the incoming competence in the basic concepts which are needed to develop the main thrust of the course, for example, Limits, Rate of change in year 5 Calculus, Vectors in year 5 Algebra. The result tends to be that extra time is spent on the appropriate "review" early in the course.

Study of the extent of core and supplementary topics in year 4, especially the general course, reveals the wide variability both in the percentages of teachers who teach a given topic, and to put it slightly differently, the few topics which seem to be taught consistently by all, (or even by high percentages of) teachers. Thus, only 12 topics in all were taught by 70 percent or more of teachers in year 4 general; 5 of these topics should have been mastered previously. Of the other 7, 5 were classed as core and 2 as supplementary for the course, the core and the supplementary set of topics contained 17 items each. Similar analysis for the year 4 advanced course showed that the variability of topics taught was much less and that the

emphasis and coverage of core topics was quite high (22 of 36 core topics, and 7 of 34 supplementary topics were taught by 50 percent or more of the teachers).

At year 5 level, time allocations and analysis of the coverage of topics showed a much greater focus on the topics intended to be taught. Relations and Functions and Algebra devoted over 75 percent of time to core topics, but there was a definite tendency in the Calculus course to go well beyond the Ministry guidelines and devote a sizeable amount of time to topics in Integration, as well as to more advanced topics in Differentiation.

Common topics - topics which the teacher could decide to include or exclude in the three year 5 courses - were taught almost exclusively in the Relations and Functions and Algebra courses (11 percent and 17 percent respectively in terms of time).

Thus, at year 5 level, it is safe to say that content focus is high and that variability is low, except for Calculus, where additional and variable coverage brings the possibility of some duplication, but not a consistent one, at university level.

2. *ENTRY AND EXIT COMPETENCIES*

Study of incoming and outgoing competencies reveals wide variations, with individual topics and areas. The perceptions for basic topics and those studied previously are naturally higher than for those to be introduced or developed further in that course.

Thus, in year 4 general, Basic arithmetic and Algebra have incoming values of 1.9 and 1.4 respectively, whereas for Quadratic functions and equations the value is 0.3. Similar comments apply to the other mathematics courses. The range of gains in competence for individual topics is also considerable, usually with a minimum of 0.7 or 0.8 and a maximum of somewhere around 2, with variations from course to course.

Mean levels of competence for year 4 general are entry 1.0, exit, 2.4, with corresponding values of 1.5 and 3.2 for core topics. For year 4 advanced the corresponding figures are 1.1 and 2.7, indicating a higher gain (1.7 vs 1.4), presumably because the course is more difficult and attracts a more able student population. Year 5 mean entry levels are low

for Relations and Functions, Algebra and Advanced approach topics in Calculus courses, (0.2 to 0.4), since mainly new concepts and topics are introduced, but higher, (0.8) for topics taught in Relations and Functions courses, which build more on topics already taught in year 4 advanced. Exit levels are a little over 3, except for Calculus, where the effect of teaching additional topics not in the guideline produces an overall exit level of 2.4, compared to one of 2.9 for the 15 Elementary approach topics.

In content coverage, variability is very high for year 4 general, with failure to cover the intended topics adequately; this can result in gaps in successive courses. Year 4 advanced is relatively cohesive, as are Relations and Functions and Algebra in year 5. Calculus shows low variability with additional topics covered, and the possibility that duplication will ensue in year 1 of university.

Competency levels are themselves widely variable, but not in unpredictable ways. Perceived exit levels from year 4 average 2.4 (G) and 2.7 (A), while for year 5 they are 3.2 (R/F); 3.1 (A); 2.4 (C) depressed from 2.9 by the teaching of additional topics.

COLLEGE MATHEMATICS/MATHEMATIQUES YEAR 1

A. The Sample

1. *EVOLUTION OF THE PRESENT MATHEMATICS COURSES*

Colleges of applied arts and technology began operation in 1967. The only readily available blueprints were the courses already operating in technical colleges such as the Ryerson Polytechnical Institute in Toronto and Ottawa's Eastern Ontario Institute of Technology. Over the years, each college has developed its own courses to meet regional and local needs. Since colleges are required to admit all students with year 4 diplomas, many of whom lack the appropriate course credits, there has been considerable pressure to admit students inadequately prepared for the normal first-year college mathematics courses. The students' lack of ability to do basic mathematics has been demonstrated by surveys such as Project Zero, carried out at St. Lawrence College, Kingston, in 1970, and by the widespread use of the computer-mediated remedial courses which were developed at the Ontario Institute for Studies in Education in connection with Seneca College some years ago. Thus, present first-year college courses in mathematics are often designed to enable poorly prepared students to catch up, either by taking a remedial course in the fall term or by doing make-up work as part of their regular first-semester course load in mathematics.

2. *THE NATURE OF THE SAMPLE*

The two divisions in colleges which place greatest emphasis on mathematics are Business and Technology; consequently, first-semester mathematics courses in these two divisions were chosen as the population to be studied.

Courses were sampled in 15 English-language colleges and in 2 colleges offering Mathematics instruction in French. Questionnaire data describing 43 courses classed as Technology and 14 classed as Business-oriented were analyzed on the computer. Questionnaire responses were also received from 4 instructors of mathématiques (Technology) and analyzed manually (See Table 7.34).

TABLE 7.34

COLLEGE MATHEMATICS YEAR 1
COURSES IN THE SAMPLE

	Business			Technology		
	Courses Offered	Courses Selected	Respondents	Courses Offered	Courses Selected	Respondents
Calculus	-	-	-	2	1	1
Algebra	-	-	-	4	2	2
Calculus and Linear Algebra	-	-	-	-	-	-
Basic Mathematics	22	10	9	100	40	40
Statistics	4	-	-	5	-	-
Accounting/Finance	13	5	4	2	-	-
Other	2	1	1	8	1	-
Total	41	16	14	121	44	43

The total population consisted of 162 first-semester mathematics courses in Business (N=41) and Technology (N=121) programs. Of the 41 Business courses, the majority were Basic Mathematics (22) and Accounting and Finance (13); the remainder were distributed among other categories. Of the 121 Technology courses, 100 were Basic Mathematics, 8 did not fit any of the categories of the study, and the rest were distributed in various categories such as Statistics (5) and Algebra (4). Only 2 of all 162 courses were classified as remedial and both carried credit.

The sample represented the same proportion (about one-third) of the available courses in Business and Technology, with the proportion holding reasonably true for Basic Mathematics (9 out of 22 Business courses and 40 out of 100 Technology courses). Technology courses were sampled in all 15 colleges, and Business courses in 11 of them.

Subsequent analysis of the 15 English-language college calendars revealed that the courses sampled were predominantly Basic Mathematics (N=49) with Accounting and Finance (N=4) as the next most frequently represented category.

B. Factors Influencing The Teaching of Courses

In this section, major factors which influence the teaching of mathematics courses will be reported. Included will be a consideration of the backgrounds of instructors, the characteristics and interests of incoming students, prerequisite conditions for entry into courses, and other factors to which instructors were asked to provide an "emphasis" rating.

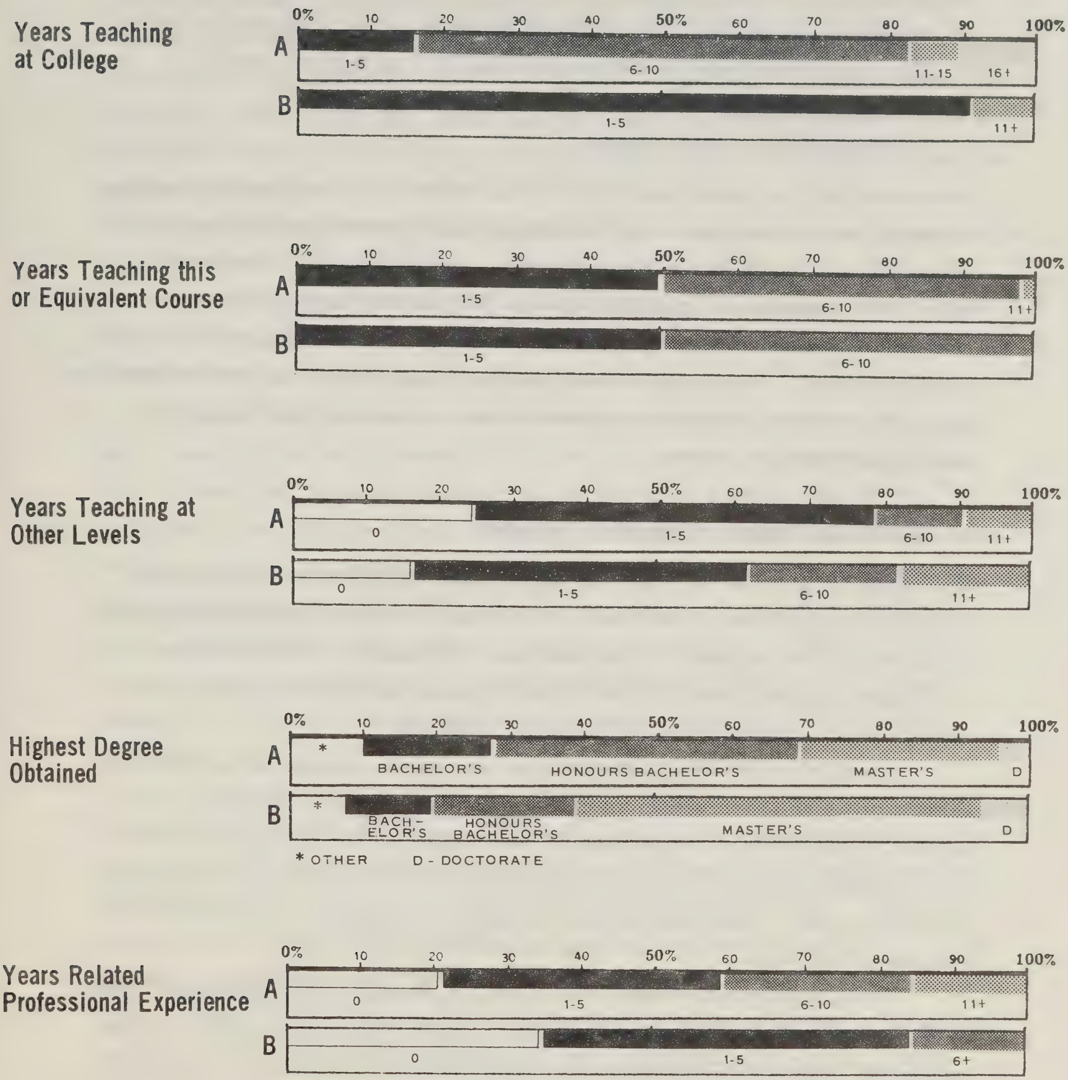
1. BACKGROUND OF THE INSTRUCTORS

Data relating to the professional experience of instructors are summarized in Figure 18. The majority of mathematics instructors in both Business and Technology areas have been teaching in colleges for between 6 and 10 years. The average length of their teaching experience is somewhat less for the specific courses considered in the present study, especially for

Figure 18
BACKGROUND OF INSTRUCTORS

COLLEGES OF APPLIED ARTS & TECHNOLOGY

A - Technical Mathematics Year 1 B - Business Mathematics Year 1



the mathématiques instructors. With the exception of 3 mathématiques respondents who were classed as Instructors, the entire sample was composed of Teaching Masters. Generally speaking, data are comparable for Technology instructors in both mathematics and mathématiques, but the small size of the mathématiques sample makes it difficult to draw any general conclusions. Quite high percentages (75 percent or more) of all instructors held an Honours Bachelor's or higher degree.

2. *PREREQUISITES OF THE COURSE*

Prerequisites for entry into first-year Technology Mathematics courses operated to a high degree (all mathématiques courses and 84 percent in mathematics). In the Business programs, prerequisites were used in only 6 (43 percent) of the 14 colleges for which data was analysed.

All mathématiques courses required successful completion of at least the year 4 secondary school mathématiques courses. For mathematics the most frequently-used prerequisite was successful completion of a year 4 mathematics course.

3. *CHARACTERISTICS OF INCOMING STUDENTS*

According to the survey questionnaire, both Business and Technology instructors perceived the degree of variation among incoming students to be high; 86 percent of the Business Mathematics and 84 percent of the Technology Mathematics instructors perceived "a great deal" of variation in competencies of incoming students.

Quality of student preparation was rarely perceived as good by either group of instructors (Business Mathematics = 7 percent; Technology Mathematics = 14 percent). The majority of instructors felt that preparation was fair but 30 percent of the Technology Mathematics instructors and 7 percent of the Business Mathematics instructors viewed it as poor.

Instructors were asked to estimate, in very general terms, those areas in which they perceived variation among incoming students to be greatest: knowledge was cited by 71 percent of instructors in Business

Mathematics and 63 percent in Technology Mathematics. Smaller percentages (between 36 percent and 58 percent) viewed either skills or attitudes as the most variable areas.

Only low percentages of instructors felt that students were particularly well prepared in any of the three areas, and about 40 percent of both instructor groups thought that students were not particularly well prepared in any of them. Two-thirds of both instructor groups rated knowledge and skills as areas in which students should have been better prepared; for the remaining one-third, attitudes needed greater attention.

Responses for the mathématiques instructors were fairly compatible with the above.

This general information is supported by data drawn from Section IV of the questionnaire, dealing with instructors' perceptions of the level of students' competence at entry and exit.

Table 7.35 indicates the percentage ranges of instructors who were dissatisfied with number of topics in each of the 11 topic areas. (The measure of "dissatisfaction" is defined in Section B.2 of the Secondary School Mathematics report.) In 7 of the 12 Basic Arithmetic topics, between 21 percent and 40 percent of the Business Mathematics instructors were unhappy with competence levels of entering students.

Some topic areas, notably Analytic geometry and vectors, Synthetic geometry, and Trigonometry, complex numbers and statics, were rarely taught by Business instructors and should be ignored in the present discussion.

The topic areas of greatest dissatisfaction to Business Mathematics instructors are clearly Basic arithmetic and Basic algebra, where up to 20 percent of the Business respondents were dissatisfied with incoming competencies in 8 of 12, and 10 of 22 topics, respectively. Dissatisfaction among Technology Mathematics instructors was widespread in Basic algebra (where more than 40 percent were dissatisfied with 14 of the 22 topics), and it is noticeable in the areas of Basic arithmetic, Quadratic functions and equations, Exponential and logarithmic functions, and Trigonometry, complex numbers and statics. Mathématiques instructors

TABLE 7.35

COLLEGE MATHEMATICS YEAR 1
PERCENTAGE RANGE OF INSTRUCTORS PREFERRING
A HIGHER LEVEL OF STUDENT COMPETENCE AT ENTRY

	% Ranges of Instructors														
	Business					Technology									
						Mathematics					Mathématiques				
	Topics Not Taught	0%	1-20%	21-60%	61-100%	Topics Not Taught	0%	1-20%	21-60%	61-100%	Topics Not Taught	0%	1-20%	21-60%	61-100%
I Basic Arithmetic (12)[a]	0	0[b]	2	9	1	0	0	2	9	1	0	4	0	7	1
II Business Arithmetic (12)	3	4	4	1	0	9	3	0	0	0	12	0	0	0	0
III Basic Algebra (22)	3	3	7	9	0	0	0	2	14	6	4	0	0	6	12
IV Quadratic Functions and Equations (12)	7	0	4	1	0	0	0	8	4	0	6	0	0	5	1
V Exponential and Logarithmic Functions (14)	4	0	6	4	0	0	0	4	10	0	0	1	0	8	5
VI Sequences and Series (5)	4	1	0	0	0	1	0	4	0	0	5	0	0	0	0
VII Analytic Geometry and Vectors (15)	13	0	2	0	0	3	0	10	2	0	9	2	0	2	2

[a] No. of subtopics given in parentheses

[b] No. of subtopics within each percentage range

TABLE 7.35 (Cont'd)

COLLEGE MATHEMATICS YEAR 1
PERCENTAGE RANGE OF INSTRUCTORS PREFERRING
A HIGHER LEVEL OF STUDENT COMPETENCE AT ENTRY

	% Ranges of Instructors														
	Business					Technology									
						Mathematics					Mathématiques				
	Topics Not Taught	0%	1-20%	21-60%	61-100%	Topics Not Taught	0%	1-20%	21-60%	61-100%	Topics Not Taught	0%	1-20%	21-60%	61-100%
VIII Synthetic Geometry (10)	10	0	0	0	0	4	0	6	0	0	10	0	0	0	0
IX Trigonometry, Complex Numbers and Statics (18)	18	0	0	0	0	1	0	5	12	0	2	7	0	6	3
X Calculus (15)	9	6	0	0	0	1	11	3	0	0	MISSING DATA				
XI Statistics and Probability (10)	9	1	0	0	0	2	0	8	0	0	MISSING DATA				
Totals (145)	80	15	25	24	1	21	14	52	51	7	48	13	0	34	24

are equally dissatisfied with Basic algebra, and even more dissatisfied with competence in Trigonometry, complex numbers, and statics.

4. *OTHER FACTORS INFLUENCING THE TEACHING OF THE COURSE*

In general, the factors seen as being of greatest importance were information about students' future career patterns, assigned course outlines, the relationship of the course to other concurrent courses, and the knowledge of the subject by incoming students. No clear pattern was evident across the three instructor groups for which data were available (Table 7.36).

C. Characteristics of the Course

1. *AIMS OF THE COURSE*

Table 7.37 provides the final ranking, based on the weighting scale described in the Secondary School Mathematics report, for 33 general aims in the teaching of mathematics. "Conceptual and practical tools for mathematical application", "Ability to understand a problem stated in English and translate it into mathematical language to solve it", and "Ability to apply knowledge and skills to other subject areas or situations" were all ranked among the first 5 aims by all three groups of instructors.

There were, however, marked differences of opinion between instructors in Business and in Technology courses about the relative importance of certain of the most highly ranked individual aims. Technology Mathematics instructors placed greater emphasis on "Skills needed for further courses or work in mathematics" and "Ability to use and understand fundamental terminology". Business instructors were more concerned with "Ability to check the reasonableness of an answer", and "Ability to work independently".

When aims were grouped in 5 categories (see corresponding Aims section in the Secondary School report), Category A (Basic Applied Skills) was ranked second and Category E (Appreciation and Attitudes to Mathematics) was last. Surprisingly, the two sets of Technology

TABLE 7.36

COLLEGE MATHEMATICS YEAR 1
FACTORS INFLUENCING THE TEACHING OF THE COURSE

	Business				Technology			
	Great Extent %	Moderate Extent %	Small Extent %	Not at All %	Great Extent %	Moderate Extent %	Small Extent %	Not at All %
Interests of students	22	50	14	14	19	34	32	15
Students knowledge	50	29	14	7	51	26	9	14
Relationship with concurrent courses	22	64	7	7	49	37	5	9
Information on students' future plans	36	57	7	-	44	40	9	7
Ontario Ministry of Education guidelines	-	10	-	90	-	13	19	68
Assigned course outline	62	15	-	23	65	22	5	8
Teachers' special interests or training	14	21	43	21	21	31	27	21
Content and approach of principal text(s)	42	16	42	-	12	48	31	9
Staffing	29	29	-	42	12	16	3	69
Other	-	14	-	86	13	-	-	87

TABLE 7.37

COLLEGE MATHEMATICS YEAR 1
INSTRUCTORS' EMPHASIS ON GENERAL AIMS

Aim	Business Mathematics		Technology Mathematics		Technology Mathématiques	
	WM[a]	R[b]	WM	R	WM	R
1. Ability to use and understand fundamental terminology	2.0	9	2.4	5	1.8	13
2. Conceptual and practical tools for mathematical application	2.6	1	2.7	1	2.8	1
3. Skills needed for further courses or work in mathematics	2.3	3	2.7	1	1.8	13
4. Ability to apply knowledge and skills to other subject areas or situations	2.2	5	2.6	3	2.8	1
5. Skills related to subsequent occupations	2.1	7	1.9	13	2.3	5
6. Sound and systematic study habits	1.5	12	2.1	11	1.8	13
7. Ability to work independently	2.2	5	2.2	9	2.0	7
8. Ability to assess own skills and abilities	1.2	18	1.7	16	1.3	22
9. Ability to estimate an answer	2.0	9	2.3	8	2.0	7
10. Ability to check the reasonableness of an answer	2.3	3	2.4	5	2.0	7

[a] WM= weighted mean. Each category was assigned a weighting: 0-not at all, 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b] R= rank. Factors were ranked on the basis of weighted means.

TABLE 7.37 (Cont'd)

COLLEGE MATHEMATICS YEAR 1
INSTRUCTORS' EMPHASIS ON GENERAL AIMS

Aim	Business Mathematics		Technology Mathematics		Technology Mathématiques	
	WM	R	WM	R	WM	R
11. Ability to construct, use, and interpret concrete models and mathematical diagrams	1.5	12	2.1	11	2.0	7
12. Ability to understand a problem stated in English and translate it into mathematical language to solve it	2.4	2	2.5	4	2.5	3
13. Ability to use symbolic notation	1.5	12	2.2	9	2.5	3
14. Ability to read a mathematical textbook	1.0	23	1.9	13	2.0	7
15. Familiarity with basic literature and use of resources (library, texts, other students and colleagues)	.7	25	1.0	25	1.3	22
16. Ability to write a proof	.3	30	.6	30	1.0	27
17. Ability to make and test generalizations	.5	29	.8	27	1.0	27
18. Ability to work intuitively and use appropriate levels of intuition and rigour	.6	28	1.3	21	1.5	19

TABLE 7.37 (Cont'd)

COLLEGE MATHEMATICS YEAR 1
INSTRUCTORS' EMPHASIS ON GENERAL AIMS

Aim	Business Mathematics		Technology Mathematics		Technology Mathématiques	
	WM	R	WM	R	WM	R
19. Ability to understand logical argument and the direction of an implication	.7	25	1.5	18	1.3	22
20. Ability to use examples and counter-examples	1.2	18	1.2	23	1.8	13
21. Ability to think logically in order to solve problems systematically and make rational decisions	1.2	18	2.4	5	2.0	7
22. Ability to solve multi-stage problems	1.5	12	1.9	13	1.8	13
23. Ability to formulate and work from usable definitions	1.2	18	1.3	21	1.5	19
24. Appreciation and/or understanding of the underlying structure of mathematics	1.2	18	1.4	19	1.0	27
25. In-depth understanding of some area or topic in mathematics	1.3	16	1.4	19	1.5	19
26. Appreciation of the nature and importance of proof in mathematics	2.1	7	.8	27	1.3	22

TABLE 7.37 (Cont'd)

COLLEGE MATHEMATICS YEAR 1
INSTRUCTORS' EMPHASIS ON GENERAL AIMS

Aim	Business Mathematics		Technology Mathematics		Technology Mathématiques	
	WM	R	WM	R	WM	R
27. Appreciation of the contribution of mathematics to civilization	.7	25	.7	29	.3	33
28. Appreciation of the power of mathematics to solve complex problems	1.3	16	1.6	17	1.3	22
29. Understanding and appreciation of the unity of mathematics through the interrelationships of its various branches	.0	32	.0	32	.5	32
30. Appreciation of mathematical elegance, e.g. in a proof	.3	30	.5	31	.8	31
31. Judgement and discrimination about appropriate procedures and their relevance to solving specific problems	.0	32	.0	32	1.8	13
32. Positive attitudes for mathematics	1.0	23	1.2	23	2.3	5
33. Appreciation of mathematics as a human activity aimed at extending man's knowledge, and his understanding and use of his environment	2.0	9	1.0	5	1.0	27

instructors differed in their ranking of the categories, with the mathématiques instructors emphasizing Category D (Higher mathematical abilities) first and Category A third, while the mathematics instructors' corresponding ranks were 4 and 1, respectively.

2. *COURSE CONTENT AND STUDENT COMPETENCE*

(a) *Time Allocation*

Mean time allocations for the 11 topic areas for both Business and Technology divisions are given as percentages in Table 7.38.

Business instructors, as noted earlier, spend most of their course time on Basic arithmetic (43.1 percent), Business arithmetic (25.9 percent) and Basic algebra (20.7 percent). On the average, Exponential and logarithmic functions receive over 5 percent of teaching time. The single topics receiving greatest time allocation are Interest (17.2 percent) and Percentage (8.2 percent). Others receiving more than 4 percent on average are Linear equations (6 percent), Fundamental arithmetic, Bonds and debentures, and Pictorial representation of data. The topic areas of Calculus, Statistics and probability, Analytic geometry, Synthetic geometry and Trigonometry received a total of 1.8 percent.

In the technological division, the area receiving greatest time allocation was basic algebra (34.5 percent) followed by Trigonometry and allied topics (21.5 percent), Exponential and logarithmic functions (13.4 percent) and Basic arithmetic (13.2 percent). No specific individual topics received a large time allocation, the greatest times being spent on Linear equations in one unknown (3.8 percent), Algebraic expressions (3.6 percent), with 6 Trigonometric, 4 Basic algebra and 2 Basic arithmetic topics each receiving over 2 percent. Calculus (2.6 percent) and Statistics and probability (1.8 percent) again received little emphasis.

Analysis of time allocations made by the mathématiques Technology instructors yielded comparable emphasis in the same three major topic areas, though there was greater emphasis on Functions (Sections IV, V, IX) and Analytical geometry (Section VII), and less emphasis on Basic arithmetic (Section I).

TABLE 7.38

COLLEGE MATHEMATICS YEAR 1
TIME ALLOCATED TO TOPIC AREAS

	Topic Area	% Time Allocated		
		Business	Technical	
		Mathematics	Mathematics	Mathématiques
I	Basic Arithmetic	43.1%[a]	13.2%	8.3%
II	Business Arithmetic	25.9	0.9	
III	Basic Algebra	20.7	34.5	33.0
IV	Quadratic Functions and Equations	1.8	5.6	8.2
V	Exponential and Logarithmic Functions	5.6	13.4	16.8
VI	Sequences and Series	0.7	0.6	
VII	Analytic Geometry and Vectors	0.1	4.3	8.6
VIII	Synthetic Geometry		1.7	
IX	Trigonometry, Complex Numbers and Statics		21.5	25.0
X	Calculus	1.5	2.6	
XI	Statistics and Probability	0.2	1.8	

[a]Mean time allocations, representing the sums of the mean percentages for individual topics in specific topic areas.

(b) Teaching of Particular Topics

The major topic areas emphasized by Business Mathematics instructors were Basic arithmetic, Business arithmetic, Basic algebra, and Exponential and logarithmic functions. Other areas are rarely taught. Individual topics within these and other topic areas are taught by varying percentages of instructors; for example, the range of instructors teaching Basic arithmetic topics is 7 to 79 percent, with Percentage being taught by 79 percent of the instructors and Simple and compound interest by 64 percent. Scrutiny of the data on the teaching of individual topics reveals that only 15 of them are taught by 5 or more of the 14 instructors. Emphasis is predominantly on topics in Basic arithmetic (8 out of 12) and Basic algebra (7 out of 22). The topics emphasized most (taught by 9 or more instructors) were Arithmetic - Percentage, simple and compound interest; Algebra - Linear equations and word problems involving one unknown. Surprisingly, Metric system: système international d'units (S.I.R.) was taught by only 7 percent.

In Basic algebra, the topics taught by the greatest percentages of business instructors were Linear equations and word problems involving one unknown (64 percent), and Generalized arithmetic: literal notation, idea of variable (57 percent). All of these Basic arithmetic and algebra topics are supposed to have been taught in year 3 secondary school or earlier.

Technology instructors teach Basic algebra most, followed in emphasis by Basic arithmetic, Trigonometry, complex numbers and statics, and Exponential and logarithmic functions (Table 7.39). Seven of 12 Basic arithmetic topics are taught by more than 40 percent, 16 of 22 Algebra topics, and 9 of 18 Trigonometry topics. Topics receiving greatest emphasis are Scientific notation (64 percent), the linear equation topics by 60 to 74 percent, Factoring and Formulae, and basic trigonometric concepts including Radian measure and Solution of triangles. Work with algebraic expressions and formulae is taught by 80 percent of the instructors. There is apparently no single topic which is taught by all instructors. Clearly, variability is great.

TABLE 7.39

COLLEGE MATHEMATICS YEAR 1
PERCENTAGE OF INSTRUCTORS TEACHING GROUPS OF TOPICS

	Topic Area	% of Instructors					
		Business Mathematics		Technology			
				Mathematics		Mathématiques	
		$\bar{X}$	Range	$\bar{X}$	Range	$\bar{X}$	Range
I	Basic Arithmetic	34.5%	7-79%	40.3%	12-65%	58.3%	0-100%
II	Business Arithmetic	11.3	0-36	1.0	0-5	2.0	0-25
III	Basic Algebra	19.8	0-64	51.4	12-81	55.6	0-100
IV	Quadratic Functions and Equations	4.0	0-21	23.1	2-56	25.0	0-75
V	Exponential and Logarithmic Functions	13.2	0-36	37.2	16-58	60.7	0-100
VI	Sequences and Series	1.4	0-7	7.0	0-12		
VII	Analytic Geometry and Vectors	.9	0-7	13.2	0-49	20	0-75
VIII	Synthetic Geometry			3.8	0-12		
IX	Trigonometry, Complex Numbers and Statics			38.1	0-72	27.7	0-100
X	Calculus	2.8	0-7	7.6	0-16		
XI	Statistics and Probability	.7	0-7	4.7	0-9		

(c) Numbers of Topics Taught by Percentage Ranges of Instructors

The differing emphasis between Business and Technology Mathematics courses is clearly seen in Table 7.40. The first column shows how many topics are not taught at all. As already noted, Business instructors (and in fact all instructors) emphasize Arithmetic, Algebra and Exponential and logarithmic functions (topics I, III, V). Business instructors naturally emphasize Business mathematics as well. Technology instructors teach a wider range of topics, including topics from Sections VII and especially IX (Analytic geometry, and Trigonometry). Although there were only 4 mathématiques respondents, there is quite a striking correspondence in the topic area emphasis between Technical Mathematics and mathématiques.

(d) Student Achievement at Entry and Exit

Business: Average student competence levels for entry to and exit from Business Mathematics courses, summarized in Table 7.41, indicate that only the first five of the major topic areas are included in these courses. It should be recalled, however, that these are first-semester courses.

The basis for making general statements is not great, since it is clear that on the average only 6 of the 14 instructors have been teaching many topics, as can be seen from the small percentage of responses. What this means is that only some of the individual topics within a given area are being taught. In fact, only one topic--Percentage--was taught by more than 9 instructors.

Based on the data in Table 7.41, in the first 5 topics, the area of lowest average student competence on entry is Business arithmetic (0.4) and that of highest average student competence on entry, Basic arithmetic and Basic algebra (1.3). Exit levels, except for Exponential and logarithmic functions (2.2), are about 3 on the rating scale or just over. Overall entry and exit means are 1.2 and 3.2, indicating a gain of 2 points on the rating scale.

The average entry and exit competence for topics in Basic arithmetic were 1.3 and 3.2; and for Basic algebra, 1.3 and 3.2 (Table 7.41). These competence ratings, generally, are in line with the levels indicated by instructors for the whole course.

TABLE 7.40

COLLEGE MATHEMATICS YEAR 1
NUMBER OF TOPICS TAUGHT BY PERCENTAGE RANGES OF INSTRUCTORS

		Business						Technical					
		0%	1-20%	21-40%	41-60%	61-80%	81-100%	0%	1-20%	21-40%	41-60%	61-80%	81-100%
I	Basic Arithmetic (12)		2	7		2	1			2	6	4	
II	Business Arithmetic (12)	3	6	3				9	3				
III	Basic Algebra (22)		9	6	5	2				6	5	7	4
IV	Quadratic Equations (12)	6	4	2					4	5	2	1	
V	Exponential and Logarithmic Functions (14)	4	5	5					1	7	5	1	
VI	Sequences and Series (5)	5							5				
VII	Analytic Geometry and Vectors (15)	13	2						12	1	2		
VIII	Synthetic Geometry (10)	10							10				
IX	Trigonometry, Complex Numbers and Statics (18)	18							4	5	4	5	
X	Calculus (15)	15						1	14				
XI	Statistics and Probability (10)	9	1					1	9				

TABLE 7.41

COLLEGE MATHEMTICS YEAR 1
LEVELS OF COMPETENCE AT ENTRY AND EXIT[a]

Major Topic	Business					Technology				
	Entry		Exit		%	Entry		Exit		%
	$\bar{X}$	SD	$\bar{X}$	SD	Responding	$\bar{X}$	SD	$\bar{X}$	SD	Responding
I Basic Arithmetic (12)	1.3	1.0	3.2	0.8	39%	1.8	1.0	3.1	0.8	51%
II Business Arithmetic (12)	0.4	1.0	2.9	0.9	13%	0.4	0.9	2.2	0.5	1%
III Basic Algebra (22)	1.3	0.9	3.2	0.8	20%	1.4	0.9	2.9	0.8	58%
IV Quadratic Functions and Equations (12)	1.2	0.9	3.4	0.8	5%	1.0	0.8	2.5	1.0	27%
V Exponential and Logarithmic Functions (14)	1.0	0.9	2.2	0.8	13%	1.0	0.9	2.8	0.8	41%
VI Sequences and Series (5)	1.0	0.0	3.0	0.0	1%	1.0	0.8	2.3	0.8	12%
VII Analytic Geometry and Vectors (15)	2.0	0.0	3.0	0.0	1%	1.0	0.8	2.4	1.2	18%
VIII Synthetic Geometry (10)	0.0	0.0	0.0	0.0	0%	0.9	0.8	1.7	1.4	8%
IX Trigonometry, Complex Numbers and Statics (18)	0.0	0.0	0.0	0.0	0%	0.9	1.0	2.8	0.9	41%
X Calculus (15)	0.0	0.0	3.0	0.0	3%	0.3	0.5	0.6	0.9	9%
XI Statistics and Probability (10)	0.0	0.0	3.0	0.0	1%	0.2	0.4	2.1	1.0	6%
Grand Average	1.2	1.0	3.2	0.8		1.2	1.0	2.8	0.9	
Adjusted Average[b]	1.2	1.0	3.2	0.8		1.3	0.9	2.8	0.9	

[a]Competence was rated on a scale: 0- no knowledge; 1- Descriptive knowledge; 2- Elementary; 3- Working grasp; 4- Thorough understanding; 5- Complete mastery.

[b]Based on Topic Areas I, II, III, IV and V.

Technology: Table 7.41 also gives the comparable data for the technology courses, where emphasis is mainly on Basic algebra, Trigonometry, Basic arithmetic and Exponential and logarithmic functions, with less emphasis on Quadratic functions and Analytic geometry. Mean entry and exit levels are 1.2 and 2.8, indicating the same entry level but a lower exit level than for Business, with a net average gain of 1.6.

Perceptions of incoming student competence for the major topic areas taught by Technology instructors are Arithmetic 1.8, Algebra 1.4, and Trigonometry 0.9. The exit level means (3.1, 2.9 and 2.8) indicate greatest improvement in Trigonometry (1.9), followed by Algebra (1.5).

Data are very sparse for the Technical Mathématiques courses. Mean entry and exit competence levels overall are 1.4 and 2.3, a gain of 0.9. Entry levels for the four topic areas most taught (I,III,V,IX) are comparable with those for Technical Mathematics, but exit levels are definitely lower, 1 scale point for both Exponential and logarithmic functions (1.8), and Trigonometry, complex numbers and statics (1.8).

One possible explanation for the lower exit level in mathématiques, other than the small number of instructors sampled, is that these courses devote more time to topics from early sections, especially Quadratic equations, and less to later topics such as Trigonometric functions.

Table 7.42 summarizes the mean entry/exit data for 12 topics that were taught by 60 percent or more of the Technology Mathematics instructors. It is interesting to note that, of the 12, 7 topics are from Basic algebra, the topic area with which Technology instructors were most dissatisfied with respect to incoming student competence.

3. *TEACHING METHODS*

(a) *Instructional techniques*

In Business Mathematics, the three most heavily used techniques were lecturing, Socratic interaction, and classroom study. Six of the instructors used lecturing more than 30 percent of the time, and three used the Socratic approach more than 25 percent of the time. Over 40 percent of instruction time was individualized by 3 teachers but 10

TABLE 7.42

COLLEGE MATHEMATICS YEAR 1 TECHNOLOGY
ENTRY AND EXIT LEVELS OF COMPETENCE FOR 12 SUBTOPICS
TAUGHT BY 60 PERCENT OR MORE OF THE INSTRUCTORS

		% of Instructors Teaching (N=43)	Entry $\bar{X}$	Entry SD	Exit $\bar{X}$	Exit SD
I.6	Scientific notation: conversion to and from.	65	1.5	0.9	3.3	0.7
I.7	Scientific notation: use in computation and estimation.	65	1.4	1.0	3.2	0.9
III.1	Generalized arithmetic: literal notation, idea of variable	60	2.2	0.8	3.3	0.6
III.2	Manipulating, simplifying and evaluating algebraic expressions.	81	1.9	0.6	3.1	0.6
III.3	Linear equations and word problems involving one unknown.	74	1.8	0.8	3.1	0.6
III.4	Systems of linear equations in 2 unknowns and applications.	74	1.7	0.9	3.1	0.6
III.9	Factoring: various types, complex fractions.	70	1.6	0.6	3.0	0.6
III.10	Operations with rational algebraic fractions	67	1.6	0.6	3.0	0.5
III.15	Manipulation, rearrangement, evaluation of algebraic formulae	79	1.7	0.7	3.1	0.5
IX.1	Primary and reciprocal trigonometric functions (definitions, graphs, properties).	72	1.8	0.7	3.4	0.6
IX.3	Radian measure.	72	0.7	0.9	2.8	0.5
IX.9	Solution of right-angled triangle.	67	1.9	0.9	3.4	0.6

others did not use this technique at all (Table 7.43).

Similar comments apply to the Technology mathematics instructors, with minor variations. Lecturing is again the most favored technique, used even more frequently by this group of instructors (22 instructors use it over 20 percent of the time). Classroom study is used about as often as Socratic interaction. Individualized instruction and practically-oriented work are also used to a fair degree by between one-half and one-third of the instructors.

The 4 mathématiques instructors tend to use classroom study more extensively than Socratic interaction.

A summary of course outlines obtained from 4 colleges shows the same kind of variety, with mention being made of computer-assisted and other forms of individualized instruction.

(b) Out-of-class work

Just less than a half of the instructors (Business Mathematics - 5; Technology Mathematics - 20) estimated that the average out-of-class time spent on course assignments was between three-quarters of an hour and an hour for every hour of class time. Only 8 instructors estimated it to be greater than that. The estimates for 2 mathématiques courses were similar; a third course required between an hour and a half and two hours' work.

(c) Provision for individual progress

About half the instructors made some provision for individual progress. Only 7 of the 57 mathematics instructors, however, and none of the mathematiques instructors responded that their course allowed for individualization to any great extent.

(d) Time allotted to review

Responses of college instructors to the appropriate question in the survey indicated that 4 of the 8 Business and 17 of the 26 Technology instructors who responded spent over 10 percent of the total class time on review.

The emphasis on review was far greater in the case of Technology, where 8 of the instructors spent over 50 percent of total class time on it.

Of the 3 mathématiques instructors responding, 2 apparently did not review, and the third spent over 40 percent of class time in review.

TABLE 7.43

COLLEGE MATHEMATICS YEAR 1
TEACHING METHODS

	% Of Teachers Using For % Range Of Time									
	Business					Technology				
	0%	1-10%	11-20%	21-40%	41+%	0%	1-10%	11-20%	21-40%	41+%
Lecture	29%	14%	14%	21%	21%	14%	14%	21%	30%	21%
Socratic	36	14	29	14	7	19	23	28	21	9
Practically-oriented work	79	7	7		7	65	16	10	7	2
Small group activities	65	14	14	7		79	17	2	2	
Seminar, tutorial	58	14	14	14		67	19	9	5	
Classroom study	36	21	21	14	7	23	26	28	14	9
Individualized instruction	72			7	21	49	25	5	10	11
Testing	7	72	14	7		2	60	33	5	
Audiovisual	100					93	5	2		
Other	86	14				98			2	

(e) Teaching resources

A main text, mimeographed materials, and individualized learning packages were the major resources for both Business and Technology mathematics students. Texts were used to a great extent by 60 to 70 percent of the mathematics instructors. Laboratory and/or computer equipment were used by only about 30 percent of the courses, and audiovisual material by only small percentages (Table 7.44).

In Business Mathematics, 13 different texts were used, indicating a wide variety of choice by the instructors. In Technology mathematics, 16 different texts were used, but 19 instructors used the same text.

4. ASSESSMENT OF STUDENT WORK

(a) Methods of evaluation

Final examinations are used by about 30 to 35 percent of the mathematics instructors and by all 4 of the mathématiques instructors. Exemption from such examinations was possible in 16 of the 57 mathematics courses and in 1 of the mathématiques ones.

Final marks are based mainly on written tests and on mid-term and final examinations, in that order of emphasis. Seven of the 14 Business Mathematics instructors and 16 of the 43 Technology Mathematics instructors give over 75 percent of the student's final mark on the basis of written tests. Mid-term examinations are used by only 3 of the Business and 7 of the Technology Mathematics instructors, and the weight given to the examinations is quite variable among instructors who use them. Such final examinations as are given tend to have a weight of between 20 percent and 50 percent in the courses sampled (Table 7.45). Of the 4 colleges supplying details of their course evaluations, 2 based their final marks entirely on assignments and unit- or "major" tests. The other 2 used unit- or term-tests and final examinations; in one case, the ratio was 50%:50% and in the other it was 60%:40%. One of the first 2 colleges mentioned required mastery of specific, preset objectives.

TABLE 7.44

COLLEGE MATHEMATICS YEAR 1
TEACHING RESOURCES

	Use by % of Teachers							
	Business				Technology			
	Not at All	Small Extent	Moderate Extent	Great Extent	Not at All	Small Extent	Moderate Extent	Great Extent
Main text	29%		7%	64%	11%	5%	21%	63%
Main text plus supplementary text(s)	59	33		8	59	27	12	2
Two or more main texts or materials from other texts	67	17	8	8	68	22	7	3
Mimeographed materials (lecture notes, etc.)	21	29	14	36	19	23	35	23
Reference books, dictionaries, encyclopedia, journals, etc.	83	17			71	26	3	
Individualized learning packages	71			29	53	28	5	14
Laboratory and/or computer equipment	70	15		15	69	21	10	
Audiovisual media (television, tapes, film strips, etc.)	100				89	9	2	
Other	82		9	9	95			5

TABLE 7.45

COLLEGE MATHEMATICS YEAR 1
FINAL MARK ALLOCATION

	Allocation of final mark (by % ranges)									
	Business					Technology				
	0%	1-10%	11-20%	21-40%	41+%	0%	1-10%	11-20%	21-40%	41+%
Final examination	64%			28%	7%	70%		5%	16%	9%
Mid-term examination(s)	79		7	14		84		7	4	4
Other written tests				35	64	12		7	14	67
Other oral tests	100					100				
Individual papers (essays, reports, etc.)	86		7	7		91	5	2	2	
Individual projects (e.g., oral presentations)	93	7				98	2			
Group or team papers, projects	100					98	2			
Problems, exercises	71	22	7			58	19	19	4	
Notebooks	100					100				
Laboratory and/or class participation	100					95	5			
Effort	71	29				86	14			
Attendance	93	7				91	9			
Other	64	36				72	21			7

(b) Correlation between course outlines and assessment policies in a subsample of colleges

Sets of materials were received from four colleges, that were, by good fortune, well-distributed by region throughout the province; they provide a reasonable cross-section of the college population.

The material gave information about content coverage, text use, teaching methods, and assessment policies. Details of 4 Business courses (2 first-semester, 1 two-semester and 1 second-semester) and 5 Technology courses (2 first-semester, 2 two-semester and one unspecified) were available.

Time allocations were not always given, but estimates were made for each of the 9 courses.

For first semester Business courses, emphasis was very strongly on Basics: one concentrated on 4 topics in Basic arithmetic (73 percent) and on Merchandising problems (27 percent), while the other stressed Basic algebra, including linear programming (57 percent) and the presentation of data particularly related to the straight line (15 percent). The two-semester course emphasized Basics in the first term, and Business topics exclusively in the second term, while the second semester course moved to later algebraic topics and some Calculus.

No Business arithmetic, Synthetic geometry or Calculus were included in any of the five Technology courses. The heaviest emphasis was clearly on Trigonometry, followed by Exponential and logarithmic functions. The one-semester courses concentrated on Algebra and Trigonometry, with some Basic arithmetic. One of the courses, aimed at the Biological and Social Sciences, included the Arithmetic of dosages, and Probability.

Evaluation policies also varied, although term work received considerable emphasis in all cases; in no case did a final examination carry a weight exceeding 50 percent, and in 6 of the 9 courses, there was no final examination.

D. Discussion

The colleges are in general new institutions that have come into being within the last decade. They have sprung up quickly in widely differing locations and environments to serve the needs of local communities and regions. In general, they have been left to grow individually, and so on this count alone, one would expect wide variation, since they did not inherit the pressures to conformity that older institutions have developed. Additionally, because of their broad mandate, role and rapidity of growth, they have tended to bring together instructors of widely differing background and experience. Moreover, it takes time for a new type of educational institution to become integrated with the existing system, as it requires time and energy from educators within and without the new institution to get to know and understand each other's objectives, attitudes and problems. For these reasons, we may well expect great variability in courses, levels of student competence, and teaching and evaluation methods.

Teaching methods and evaluation policies in colleges are more varied and respond more to individual differences than is the case in secondary schools. Business courses are characterized by moderate use of prerequisites, variety of texts employed, and emphasis on formal work habits. Technology Mathematics courses tend toward greater use of prerequisites and less variety in texts utilized. Standards seem generally higher for Technology courses, yet marking and assessment policies suggest students still need to learn elementary mathematics, but in an adult environment.

Content coverage varies between Business and Technology courses but is in line with the intent of the particular course. However, much of the emphasis is on basic topics supposedly learned several years ago. There is therefore in practice considerable re-teaching of secondary school topics. Time allocated to basic topics and the amount of time spent on review suggest that this duplication might well be the order of 50% in Business courses and 35% in Technology courses.

The need for re-teaching is confirmed by the general dissatisfaction of instructors with the level of preparation, particularly in basic topics.

Entry levels for major topic areas show general consistency but occasional variation. For all instructors, both Business and Technology, they are between 1.0 and 1.5 for the three Algebra areas (III,IV,V) with high consistency across the three groups of instructors. Consistency is maintained for Business Mathematics (II), but for the low entry level of 0.4. Variability is greatest for Basic arithmetic (Business 1.3, Technology 1.8, Mathématiques in Technology, 2.1). Overall, entry levels are comparable (between 1.2 and 1.4).

Exit levels, however, show considerable divergence and variability, reflecting no doubt to some extent the content emphasis of each course. Thus in Business courses, exit level is high for Business arithmetic (II) (2.9) but low for Transcendental functions (V) (2.2) whereas the situation is reversed for Technology courses (2.2 and 2.8). Comparison of Technology groups shows exit levels reasonably similar for basic topics, but definitely lower in mathématiques courses for Algebra, Trigonometry areas (V, IX).

Overall exit levels and gains are greatest in Business courses, and least in mathématiques Technology courses, the range of gain being from 2.0 down to 0.9, quite a large difference.

Further study of the variety of courses and their specific objectives, as well as of the students who take them, seems essential if a clearer picture of programs and their effectiveness is to be obtained. In particular, comparison of courses where prerequisites are required, with those where they are not, would prove worthwhile. Such a study might well include detailed study of pretests and diagnostic tests administered by colleges. This would alert educators to the areas of strength and weakness and aid in the development of improved curricula.

UNIVERSITY MATHEMATICS/MATHEMATIQUES YEAR 1

A. The Sample

Out of a population of 89 first year mathematics courses given in English at 10 Ontario Universities, 43 were selected, 39 returns were received (2 of which had not been completed) and 37 were analysed. In addition, a total of 5 responses for mathématiques were received and analysed. Developments in modern mathematical research and applications have brought to the fore new fundamental concepts and branches such as matrices, linear algebra and modern abstract algebra, and have been responsible for a considerable re-orientation of Honours Undergraduate Mathematics programs to allow room for courses in Modern Algebra and Linear Algebra as well as the traditional Calculus course. The new courses were first offered in the early 1950's at senior levels of study. Parallel to this, the phenomenal development in computer technology and the growing need to solve computer problems in biological and social science areas produced a demand for Computing and Statistics courses. The present spectrum of year 1 courses in Ontario universities largely reflects these changes

Other factors influencing the courses now offered have been increased student enrolments and the introduction, in 1966, of Calculus and Modern Algebra topics at the year 5 secondary school level. These developments have enabled separate courses to be offered covering the same essentials of Algebra and Calculus but placing special emphasis on problems related to specific scientific disciplines. Also, first year university courses, particularly Calculus courses, can now cover more ground than they did previously.

Finally, as suggested above, the capacity of computers to manipulate large quantities of data has encouraged the introduction of courses in Computing and Statistics in all institutions, often in first year. Courses in the three major areas of Calculus, Algebra, and

Statistics, with some variations among them, form the core of first year mathematics courses.

A variety of other courses for general and specialized needs are also offered. These include service courses for engineering, social science, and life science students, courses of general interest, and courses of a remedial or make-up nature. According to university department heads, remedial courses are those which are taken by students who have had previous exposure to all, or part, of the course subject matter. Make-up courses, on the other hand, cover material not previously taught.

After the questionnaires were administered, a thorough scrutiny was made of the year 1 offerings at the 10 selected universities. The course categories that seemed to fit both the offerings and the actual sample drawn were Calculus, Algebra, Calculus and Linear Algebra, Basic Mathematics, and Statistics and Probability.

Table 7.46 indicates the total population of these course categories in the 10 universities selected, as well as the intended sample and the actual responses obtained.

TABLE 7.46

UNIVERSITY MATHEMATICS YEAR 1
COURSES IN THE ENGLISH-SPEAKING SAMPLE

Nature of Courses	Courses Offered	Courses Selected	Respondents
Calculus	27	18	18
Algebra	11	7	4
Calculus & Linear Algebra	9	7	7
Basic Mathematics	29	8	5
Statistics and Probability	5	3	3
Other	8	0	0
Total	89	43	37

The main reason for nonresponse was unavailability of instructors when questionnaires were administered in May, 1976.

Courses were also differentiated by level of specialization. Thus, 42 of 89 courses were specialized, 23 were general, and 24 preparatory (defined as having no year 5 prerequisite, yet carrying credit). Of these, 27 specialized, 8 general, and 2 preparatory were sampled.

Five mathématiques courses offered in two universities were also sampled: 2 Calculus, 2 Calculus and Linear Algebra, and 1 Algebra course.

It is clear from the calendar analysis that there is considerable variation in course complexity, and this variation is essentially a response to differing student backgrounds and the special demands of various disciplines.

B. Factors Influencing The Teaching of Courses

1. *BACKGROUND OF INSTRUCTORS*

Data showing the experience of the English-speaking instructors who responded is shown in Figure 19. Over 60 percent of the 37 instructors had been teaching at university for over 10 years, and 36 percent had been teaching the particular course sampled for over 5 years. Forty percent of the instructors had taught at other educational levels, mainly secondary, most of them for less than 5 years, none for more than 8 years. Ninety percent held a Ph.D, while 76 percent held the rank of associate or full professor.

Data for French-speaking instructors (N=5) indicated none had taught the course for more than 4 years, that 3 were relatively new and 2 quite senior, both in years at university and in rank.

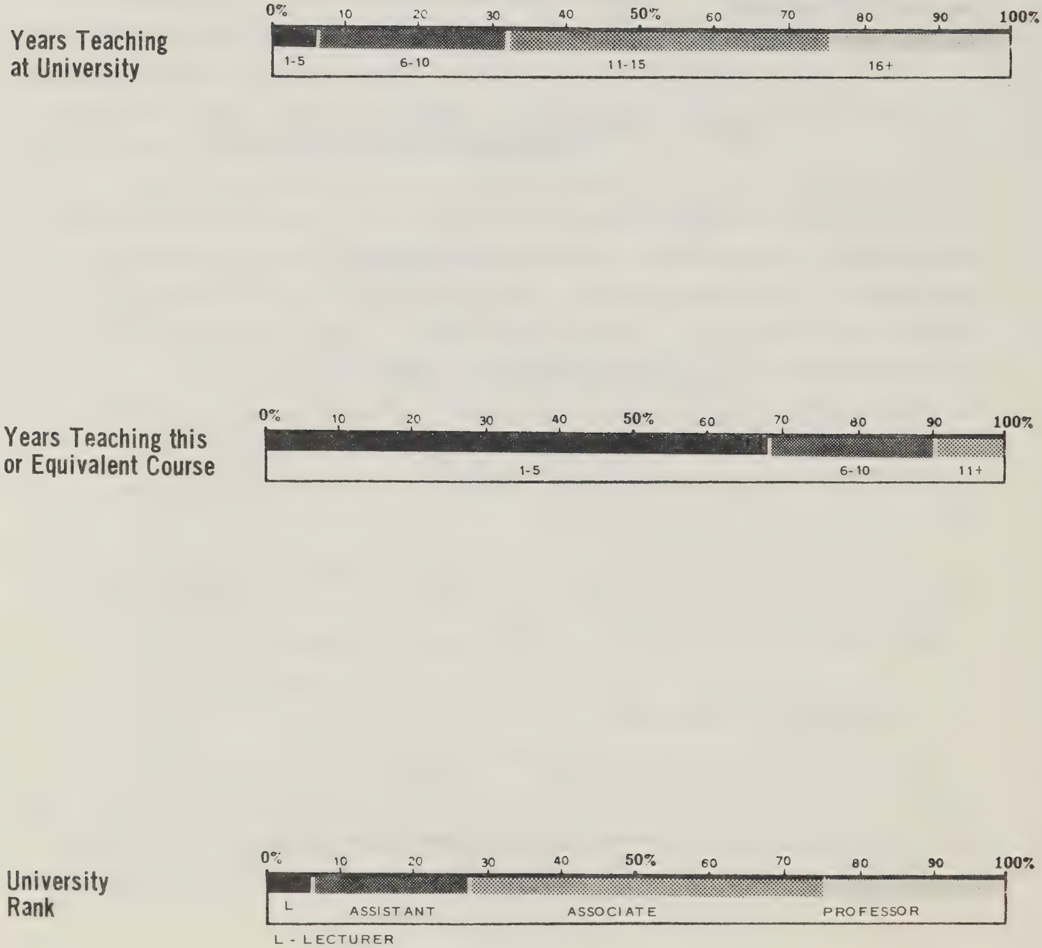
2. *PREREQUISITES OF THE COURSE*

Of the total of 42 courses sampled (37 English, 5 French), 7 had no prerequisites. Seventy-five percent or more of the courses in Calculus, Algebra, Calculus & Linear Algebra and Basic Mathematics required successful completion of year 5 courses. Only one-third of Statistics and Probability

Figure 19

BACKGROUND OF INSTRUCTORS

UNIVERSITY MATHEMATICS YEAR 1 ALL COURSES
PERCENTAGE OF INSTRUCTORS IN EACH CATEGORY



courses had prerequisites. Of the 33 courses with prerequisites, 21 required successful completion of more than 1 course of year 5.

3. *CHARACTERISTICS OF INCOMING STUDENTS*

The vast majority of instructors (87 percent) felt there was a great deal of variation in the preparation of incoming students especially in Algebra, Statistics and Probability and Calculus. Only 2 of 37 rated the variation as "very little".

Twenty-seven of 37 instructors (72 percent) rated the quality of preparation as fair or good; 16 percent rated it as poor. Dissatisfaction was greatest for Calculus, and Calculus and Linear Algebra instructors, where 12 (67 percent) and 5 (27 percent) respectively, rated preparation as fair or poor.

About 50 percent of instructors believed the area of greatest variation of incoming students to be knowledge or skills; 33 percent thought it was in attitudes. When asked to rate areas of satisfactory preparation, the numbers replying positively were low. Only 16 percent thought students well prepared in knowledge or skills while 27 percent believed attitudes were satisfactory. Asked to rate areas where preparation was deficient 29 of the 37 instructors cited skills, 15 knowledge, and 12 attitudes.

In the course of interviews 3 of the university department heads commented that incoming students were more variable in abilities than in the past, with the good ones better, and the poor ones poorer. Three other department heads noted a lack in problem-solving skills, and two a lack of enthusiasm and motivation. Several attributed these deficiencies to a lack of drill at the secondary school level, and more generally to greater variation among the students resulting from increased freedom in the choice of secondary school subjects.

Data derived from instructors' ratings of actual and preferred levels of student competence at entry supports these general assessments (see Table 7.47).

Except for Calculus, where there were 20 instructors in all, the numbers on which some of the following discussions are based are very

TABLE 7.47

UNIVERSITY MATHEMATICS YEAR 1
PERCENTAGE RANGES OF TEACHERS PREFERRING A HIGHER LEVEL
OF STUDENT COMPETENCE AT ENTRY

Topic Areas	% Ranges of Instructors																			
	Calculus					Algebra					Calculus & Linear Algebra					Basic Mathematics				
	0%	1-20%	21-40%	41-60%	61+%	0%	1-20%	21-40%	41-60%	61+%	0%	1-20%	21-40%	41-60%	61+%	0%	1-20%	21-40%	41-60%	61+%
Relations and Functions (16)[a]		10[b]	3	3		8		6	2		4	9	1	2		11	5			
Calculus (64)	7	23	25	7	1	62		2			16	13	16	17	1	63	1			
Algebra (22)	36	64				11		11			10	5	2			17	5			
Common Topics (21)	15	5	1			21					12	9				17	3	1		
General Algebra (44)						29		9	6		41	3				33	11			
Linear Algebra (33)						16		9	4	2	21	8	3	1		22	10	1		

[a] No. of subtopics in each topic area.

[b] No. of subtopics within each percentage range.

small and must be considered very tentative. As a result we have emphasized Calculus in primary analyses and discussion.

Table 7.47 summarizes the data for each course category by major topic area with regard to the percentage of instructors who would prefer a higher level of student competence at entry. The most important topic areas are those which commonly fall within each course category. For example, as expected there is virtually no Calculus taught in the Basic Mathematics courses.

Data from mathématiques courses are not included in the table but are included in the discussion.

Only 8 of the 64 Calculus topics are rated satisfactory by all instructors, and almost all are very advanced topics. There is dissatisfaction with all 15 Elementary Approach topics, the level ranging from 22 percent to 56 percent.

Nine topics, 4 of them Elementary Approach topics, are viewed as unsatisfactory by over 40 percent of the 18 Calculus instructors. The topics were: Limit of a function (intuitive approach); Other Derivatives (function of a function, trigonometric functions); Second derivative and its use; Maxima and minima problems; Inequalities; Functions (definition, algebra, composition, inverse); Continuity (definition, algebra); Related rates; Integration of logarithmic and exponential functions. The topic of greatest dissatisfaction is Inequalities. Seven of the 9 are Differentiation topics. Dissatisfaction for the two Calcul instructors is generally similar, though less pronounced, especially with Elementary Approach topics, where 9 of 15 are seen as satisfactory; four of the 9 already noted, including Inequalities were seen as unsatisfactory. Only in Basic Mathematics was there little dissatisfaction and most of it occurred for Algebra topics.

4. *OTHER FACTORS INFLUENCING THE TEACHING OF THE COURSE*

Responses received from 37 mathematics instructors have been summarized in Table 7.48. The factor with the greatest influence was Assigned course outlines followed by Students' knowledge, The content and approach of the principal text(s) and Knowledge of the subject by incoming students.

TABLE 7.48

UNIVERSITY MATHEMATICS YEAR 1
FACTORS INFLUENCING THE TEACHING OF THE COURSE

Factors	Weighted Mean[a]	Rank[b]
Interests of students	1.7	5
Students' knowledge	2.0	2
Relationship to other subjects	1.3	8
Students' career plans	1.8	4
Ontario Ministry of Education guidelines	.4	9
Assigned course outline	2.4	1
Teachers' special interests	1.4	7
Principal text(s)	1.9	3
Staffing	1.5	6

[a] WM= weighted mean. Each category was assigned a weighting: 0-not at all, 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b] R= rank. Factors were ranked on the basis of weighted means.

C. Characteristics of the Course

1. *AIMS OF THE COURSE*

The respondents were asked to rate the emphasis that their course gave to certain general mathematical aims. Their answers are summarized in Table 7.49.

The second aim listed, Conceptual and Practical Tools for Mathematical Application, was ranked highest, and it was followed closely by Ability to Use and Understand Fundamental Terminology. Ability to Think Logically in Order to Solve Problems Systematically and Make Rational Decisions was ranked third, and two aims, Skills needed for Further Courses or Work in Mathematics; and, Ability to

Understand a Problem Stated in English and Translate it into Mathematical Language to Solve it, shared the fourth position.

When the aims were grouped into the five chosen categories (explained in Secondary School Mathematics Report) and a composite rank applied to each, Category A (Basic Applied Skills) was ranked first and Category C (Basic Mathematical Abilities) second. Lowest ranked was Category E (Appreciation of or Attitudes to Mathematics). There was little difference between Category C and Category D (Higher Mathematical Abilities).

Calculus and Calculus and Linear Algebra instructors were in general agreement on the emphasis they gave to the different aims; Algebra and Basic Mathematics instructors showed some divergence. Aims considered to be important by Algebra instructors included In-Depth Understanding of Some Area or Topic in Mathematics; Ability to Write a Proof; and, Ability to Apply Knowledge and Skills to Other Subject Areas or Situations. Basic Mathematics instructors were particularly concerned about Appreciation and/or Understanding of the Underlying Logical Structure of Mathematics. All groups ranked Positive Attitudes for Mathematics fairly high.

2. *COURSE CONTENT AND STUDENT COMPETENCE*

(a) Time Allocations

Table 7.50 indicates the average amount of time allocated to groups of topics such as Differentiation and Integration by instructors in Calculus, Calculus and Linear Algebra, and Algebra.

Calculus: On the average the 20 Calculus instructors (? Calcul) spent between 26 percent and 31 percent of their teaching time on Elementary Approach topics, apparently duplicating the topics covered in the year 5 Calculus course. The English and French university instructors spent about equal percentages of time on Advanced Approach topics (English = 66.1 percent; French = 68.8 percent).

The variation for individual topic coverage is considerable for English-speaking instructors: standard deviations in general are

TABLE 7.49

UNIVERSITY MATHEMATICS YEAR 1
TEACHERS' EMPHASIS ON GENERAL AIMS

	Aim	WM[a]	R[b]
1.	Ability to use and understand fundamental terminology.	2.7	2
2.	Conceptual and practical tools for mathematical application.	2.8	1
3.	Skills needed for further courses or work in mathematics.	2.5	3
4.	Ability to apply knowledge and skills to other subject areas or situations.	2.0	8
5.	Skills related to subsequent occupations.	1.2	29
6.	Sound and systematic study habits.	1.8	16
7.	Ability to work independently.	1.9	14
8.	ABility to assess own skills and abilities.	1.3	28
9.	Ability to estimate an answer.	1.7	20
10.	Ability to check the reasonableness of an answer.	2.1	8
11.	Ability to construct, use, and interpret concrete models and mathematical diagrams.	2.1	8
12.	Ability to understand a problem stated in English and translate it into mathematical language to solve it.	2.4	4
13.	Ability to use symbolic notation.	2.1	8
14.	Ability to read a mathematical text book.	1.7	20
15.	Familiarity with basic literature and use of resources (library, texts, other students and colleagues).	1.1	30
16.	Ability to write a proof.	1.4	27
17.	Ability to make and test generalizations.	1.1	30
18.	Ability to work intuitively and use appropriate levels of intuition and rigour.	2.0	13
19.	Ability to understand logical argument and the direction of an implication.	2.2	6
20.	Ability to use examples and counter-examples.	2.1	8
21.	Ability to think logically in order to solve problems systematically and make rational decisions.	2.4	4
22.	Ability to solve multi-stage problems.	1.8	16
23.	Ability to formulate and work from usable definitions.	1.8	16

TABLE 7.49 (Cont'd)

UNIVERSITY MATHEMATICS YEAR 1
TEACHERS' EMPHASIS ON GENERAL AIMS

	Aim	WM	R
24.	Appreciation and/or understanding of the underlying logical structure of mathematics.	1.7	20
25.	In-depth understanding of some area or topic in mathematics.	1.9	14
26.	Appreciation of the nature and importance of proof in mathematics.	1.7	20
27.	Appreciation of the contribution of mathematics to civilization.	0.9	33
28.	Appreciation of the power of mathematics to solve complex problems.	1.7	20
29.	Understanding and appreciation of the unity of mathematics through the inter-relationships of its various branches.	1.0	32
30.	Appreciation of mathematical elegance, e.g., in a proof.	1.5	26
31.	Judgement and discrimination about appropriate procedures and their relevance to solving specific problems.	1.8	16
32.	Positive attitudes for mathematics.	2.2	6
33.	Appreciation of mathematics as a human activity aimed at extending man's knowledge, and his understanding and use of his environment.	1.4	26

[a]WM= weighted mean. Each category was assigned a weighting: 0-not at all, 1-to a small extent, 2-to a moderate extent, 3-to a great extent. For each item the number of responses in each category was multiplied by the weighting, the products totalled and a mean derived by dividing by the number of respondents.

[b]R= rank. Factors were ranked on the basis of weighted means.

TABLE 7.50

UNIVERSITY MATHEMATICS YEAR 1
TIME ALLOCATION

	Topic Area	Mean % of time allocated English	French
		CALCULUS	
II	CALCULUS		
	Elementary Approach		
1-10 [a]	Differentiation	20.7	28.8
11-15	Integration	5.3	2.5
	SUB-TOTAL	26.0	31.3
	Advanced Approach		
16-35	Differentiation	27.2	19.3
36-51	Integration	26.6	39.3
52-56	Sequences and Series (assigned equally to differentiation and integration)	5.6	6.1
57-60	Differentiation	3.7	4.1
61-63	Integration	2.0	0.0
64	Mathematical Modelling	1.0	0.0
	SUB-TOTAL	66.1	68.8
I, III IV, V	NON-CALCULUS TOPICS	7.8	0.0
	TOTAL	7.8	0.0
	OVERALL		
	Differentiation	54.4	54.3
	Integration	36.7	43.8
	Other Topics	8.8	0.0
	SUB-TOTAL	99.9	100.1
		CALCULUS AND LINEAR ALGEBRA	
II	CALCULUS		
	Elementary Approach		
1-10	Differentiation	8.9	13.2
11-15	Integration	1.9	1.1
	SUB-TOTAL	10.8	14.3

[a] Item numbers

TABLE 7.50 (Cont'd)

UNIVERSITY MATHEMATICS YEAR 1
TIME ALLOCATION

	Topic Area	Mean % of time allocated English	French
	<u>Advanced Approach</u>		
16-35	Differentiation	29.2	35.8
36-51	Integration	25.8	15.8
52-56	Sequences and Series (assigned equally to differentiation and integration)	4.9	13.1
57-60	Differentiation	3.4	0.0
61-63	Integration	0.2	0.0
64	Mathematical Modelling	0.8	1.0
	SUB-TOTAL	64.3	65.7
	<u>LINEAR ALGEBRA</u>		
III	Year 5 Algebra	4.3	14.5
IV	Year 5 Common Topics	0.9	1.9
VI	University Algebra	15.3	0.0
	SUB-TOTAL	20.5	16.4
	<u>OTHER TOPICS</u>		
I	Relations and Functions (Year 5)	3.3	2.2
IV	Year 5 Common Topics	0.9	1.5
V	University General Algebra	0.3	0.0
	SUB-TOTAL	4.5	3.7
	TOTAL	100.1	100.1

TABLE 7.50 (Cont'd)

UNIVERSITY MATHEMATICS YEAR 1
TIME ALLOCATIONS

Topic Area	Mean % of time allocated				
	English				French
	ALGEBRA				
YEAR 5	Course 1[b]	Course 2[b]	Course 3[c]	Course 4[c]	Course 5[c]
I Relations and Functions	0.0	0.0	0.0	0.0	7.8
II Calculus (1-15)	0.0	0.0	0.0	0.0	0.9
III Algebra[a]	19.6	11.5	0.0	0.0	31.2
IV Common Topics[a]	5.9	8.5	0.0	0.0	7.1
SUB-TOTAL	25.5	20.0	0.0	0.0	47.0
UNIVERSITY					
II Calculus (16-64)	2.3	0.0	0.0	0.0	3.5
V Foundations, General Algebra	44.2	28.5	32.0	0.0	0.1
VI Linear Algebra	28.0	51.5	68.0	100.0	49.4
SUB-TOTAL	74.5	80.0	100.0	100.0	53.0
OVERALL TOTAL	100.0	100.0	100.0	100.0	100.0
LINEAR ALGEBRA SUMMARY					
Year 5	25.5	20.0	0.0	0.0	35.7
University	28.0	51.0	68.0	100.0	49.4
SUB-TOTAL	53.5	71.0	68.0	100.0	85.1

[a] Topics taught were Linear Algebra ones, except for 2.6 percent in the French half course.

[b] Full courses

[c] Half Courses

comparable in size to the means. The time allocations given to groups of topics by the two French instructors (from two different universities) are strikingly similar, except for differing emphases on Sequences and Series, and Advanced Approach topics in Differentiation.

Table 7.50 also indicates that appreciably more time was spent on Differentiation than on Integration, especially by English-speaking instructors (roughly 55 percent of the time on Differentiation versus 40 percent on Integration). Application topics received strong emphasis (Differentiation - 9.0 percent; Integration - 13.0 percent).

Algebra: In all, 5 responses were received, 4 from English-speaking instructors. The responses related to 2 full and 3 half courses.

Analyses of the time allocations (Table 7.50) indicated that only 1 of the 5 courses, a half course, was devoted completely to the teaching of Linear Algebra at a university level. In the other 4 courses, Linear Algebra was given major emphasis, with the amount of time spent varying from 53.5 to 85.1 percent. Twenty to 40 percent of teaching time was reserved for pre-university Linear Algebra topics in 3 of the 4 courses.

Two of the 5 courses included only university topics (V and VI) but in the other 3 courses, the percentage of time spent on year 5 topics varied from between 20 percent and 47 percent; however, one of these 3 was a half course, indicating that about the same amount of time was allocated to year 1 university topics in all 3 courses.

The General Algebra topics that received most emphasis overall were Number theory, Number systems, and Polynomials and groups; the Linear algebra topics were Basic concepts, Linear operations, and Bilinear and quadratic forms.

Calculus And Linear Algebra: There were 4 English-speaking and 2 French-speaking respondents (both from the same university) who taught this course. Calculus received mean time allocations of 75.1 percent (English) and 80 percent (French), while the figures for Linear Algebra, including Section IV topics, were 20.5 percent (English) and 16.4 percent (French). Other topics, mainly from year 5 courses, received the remaining 4 percent.

In English-speaking courses, there was noticeably more time spent on Differentiation (44 percent) than on Integration (30.3 percent); in French-speaking courses, the corresponding figures were 55.8 percent and 23.4 percent, also decidedly favouring Differentiation. Thus, as much time was spent by French-speaking instructors on Differentiation as on Calculus-only topics (55.3 percent). Application topics received considerable emphasis (Differentiation = 9.3 percent; Integration = 11.0 percent).

The Linear Algebra topics taught in the French-speaking courses were entirely year 5 topics, while about one-third of those taught in the English-speaking courses were from topics listed in the university section (VI). In total, some 20 percent to 30 percent of time was allocated to year 5 topics (Sections I, II (Elementary Approach), III and IV).

Basic Mathematics: Responses were received from 5 English-speaking instructors. Time restrictions limited the depth of analysis for this sample. Major time emphasis was on Algebra topics (73.3 percent: University General Algebra = 40.1 percent; Year 5 Algebra = 16.8 percent; and, University Linear Algebra = 16.4 percent). Topic emphasis within the various sections was similar, in general, to that found in the Algebra courses already discussed. The mean time allocated to year 5 topics was 36.2 percent.

Statistics And Probability: Three responses were received from English-speaking instructors. On the average, time was allocated in the following proportions: Statistics and Probability = 70.3 percent; Calculus (Elementary Approach) = 6.6 percent; Calculus (Advanced Approach) = 17.1 percent; Algebra (year 5) - 4.6 percent; and, Other Topics = 1.5 percent; Year 5 topics received a total mean time allocation of 11.6 percent.

Twenty-nine of the 37 Probability and Statistics topics were taught, with the major missing topics including the three types of Inference as well as Decision theory. Strongest emphasis in individual topics was on Tests and confidence intervals for Proportions (5.4 percent) Conditional probability (4.7 percent), and Techniques of integration (4.4 percent).

(b) Teaching of Particular Topics

Calculus: As would be expected, the topics taught by high percentages of instructors lie almost entirely in the Calculus or the Relations and Functions sections of the content matrix (See Table 7.51). The mean percentage of instructors teaching topics 1-15 (Elementary Approach) is 66, and topics 16-64 (Advanced Approach) is 57. The first 12 topics are all taught by over 60 percent of instructors. "Advanced" topics taught by less than 30 percent are Motivation and historical introduction (25 percent) Gradient, Multiple integration, Curvature and mathematical modelling (each 17 percent).

Algebra: Instructors in Algebra courses teach predominantly Linear Algebra (average percentage teaching: 59 percent) and Algebraic topics in either section III, year 5 Algebra, or IV, Foundations and General Algebra (average percent teaching: 15.6 percent and 20.4 percent).

Linear Algebra topics up to Determinants (topic #11) are taught by all four instructors. Topics in this section not taught by any instructor are Games, Electrical circuits, and Vibration problems. The only General Algebra topic taught by more than 2 is Congruence (taught by 3 of the 4). Most of these are taught by 1 or 2. Only 8 of the 16 year 5 Relations and Functions topics are taught, and then by at most 2 of the 4 instructors.

Calculus and Linear Algebra: Calculus topics are the most heavily taught, on the average by 63 percent and 70.4 percent for topics 1-15 and topics 16-64 respectively. Quite a number (14 to be exact) of the 49 Advanced topics were taught by all instructors, and only two (Multiple Integration and Curvature) by none. Of the Linear Algebra topics, 2 and 3 Dimension spaces, Row echelon form of matrix, Systems of linear equations, and Determinants were the only four taught by more than 3 of the 7, each being taught by 5. There is clearly much greater emphasis on Calculus than on Linear Algebra in these courses, although 18 of the 22 year 5 Algebra topics are taught by 1, 2 or 3 of the group of 4 instructors.

TABLE 7.51

UNIVERSITY MATHEMATICS YEAR 1
NUMBER OF TOPICS TAUGHT BY PERCENTAGE
RANGES OF INSTRUCTORS

Topic Area	% Ranges of Instructors											
	Calculus						Algebra					
	0	1-20	21-40	41-60	61-80	81+	0	1-20	21-40	41-60	61-80	81+
I Relations and Functions (16)[a]		11[b]	3	2			9	5	2			
II Calculus (64)		4	8	12	37	3	61		3			
III Algebra (22)	8	14					9		8	5		
IV Some Common Topics (21)	15	4	2				15		5	1		
V General Algebra (45)	44	1					17		17	10	1	
VI Linear Algebra (33)	33						4		10	1	6	12
VII Probability and Statistics (37)	37						37					

Topic Area	% Ranges of Instructors													
	Calculus + Linear Algebra						Basic Math				Statistics			
	0	1-20	21-40	41-60	61-80	81+	0	1-20	21-40	41-60	0	1-20	21-40	41-60
I Relations and Functions (16)	4	6	3	3			4		16				1	
II Calculus (64)	3	1	2	20	14	24	56		8		34		30	
III Algebra (22)	4	3	9	13			6		16		15		7	
IV Some Common Topics (21)	9	6	4	2			12		9		21			
V General Algebra (45)	41	4					11		31	3	44		1	
VI Linear Algebra (33)	18	5	2	4	4		16		17		33			
VII Probability and Statistics (37)	37						37				7		8	

[a]No. of subtopics

[b]No. of subtopics within percentage ranges

[c]11 of Statistics topics were taught by 61-80% and another 11 by 80+% of Probability and Statistics Instructors.

Basic Mathematics: Topics of a functional or algebraic nature received the greatest emphasis, with practically no emphasis on Calculus, and none on Probability and Statistics.

Probability and Statistics: All 3 instructors teach 10 of the 37 Probability and Statistics topics listed. None of them teach any of the topics on Inference, Decision theory, Non-parametric statistics or Quality control.

To summarize, in Calculus courses, Calculus topics predominate, followed by Year 5 topics in Relations and Functions. In Algebra, emphasis is heaviest in Linear Algebra, followed by General Algebra. In Calculus and Linear Algebra Sections II, VI and V (Calculus; Linear Algebra; and General Algebra) are those of greatest emphasis. For Basic Mathematics, General Algebra is followed in emphasis by year 5 Algebra and Linear Algebra equally while the major emphasis in Statistics and Probability is clearly on topics in that area, with minor emphasis on Calculus.

(c) Student Achievement at Entry and Exit

The complete range of responses to the over 200 topics in the mathematics matrix is provided in Volume 2. In the discussion below we have selected highlights from the 5 major areas for analysis.

Calculus: The mean entry and exit levels estimated by 18 English-speaking instructors were 0.7 and 2.8, while for 2 French-speaking instructors they were 0.3 and 1.8. Whether the lower levels for French-speaking courses genuinely reflect reality cannot be determined with this very small sample.

Analysis of the English-speaking instructor data shows wide variation in entry and exit levels for individual topics. Table 7.52 lists those topics with entry levels 1.0 or less; 43 of the 64 Calculus topics are in this category, about equally divided between Differentiation and Integration. Of these, 5 are Elementary Approach topics - the last 5 listed for year 5 Secondary, including 4 Integration topics. In general, entry levels are lower for Integration topics

TABLE 7.52

UNIVERSITY MATHEMATICS YEAR 1
CALCULUS TOPICS FOR WHICH ENTRY LEVEL IS 1.0 OR LESS

Reference		Topic	Entry	Exit	Gain
II	10	Differential equations; anti-derivatives applied to curves and motion	0.6	2.5	1.9
	12	Areas enclosed between curves	0.6	2.9	2.3
	13	Volumes of rotation	0.5	2.7	2.2
	14	Integration using numerical methods	0.4	2.6	2.2
	15	Application involving complex numbers and/or polar coordinates	0.6	2.9	2.3
	16	The real numbers: axioms, least upper bound, completeness	0.3	2.4	2.1
	17	Proof by induction	1.0	3.1	2.1
	20	Motivation, historical introduction	0.4	2.2	1.8
	21	Definition and algebra of limits	0.8	2.9	2.1
	23	Continuity: definition, algebra of continuous functions	0.8	2.9	2.1
	24	Intermediate value	0.4	3.0	2.6
	25	Extreme value	0.1	2.8	2.6
	29	Rolle	0.4	2.7	2.3
	30	Mean value	0.3	2.6	2.3
	32	Optimization	0.9	2.7	1.8
	34	Scientific examples	0.9	2.4	1.5
	35	l'Hôpital's Rule to limits	0.1	2.9	2.8
	37	Fundamental Theorem of calculus	0.5	2.8	2.3
	38	Mean value theorem (MVT)	0.0	2.6	2.6
	39	Application of MVT to approximation	0.0	2.0	2.0
	40	Substitution	1.0	2.9	1.9
	41	Trigonometric substitution	0.4	3.1	2.7
	42	Parts	0.5	3.0	2.5
	43	Partial fractions	0.1	2.7	2.6
	45	Volume	0.3	2.7	2.3
	46	Work	0.4	2.3	1.9
	47	Arc length	0.0	2.6	2.6
	48	Improper integrals	0.0	2.7	2.7
	49	Taylor's theorem	0.0	2.3	2.3
	51	Hyperbolic functions	0.0	2.5	2.5
	52	Definition and algebra of limits	0.2	2.3	2.1

Items 53 - 64 had 0 level entry but were not taught.

than Differentiation topics. Eighteen Integration topics were rated zero entry competence as well as the 5 Sequences and Series topics which involve both Differentiation and Integration.

Table 7.53 shows the topics which have highest exit levels, defined as 3.0 or above, of which there are 19. Seven of them are year 5 topics, and only 6 of the 19 are Integration topics, the majority relating to Differentiation.

The range of entry levels extends from 0 to 2.07, and the range of exit levels from 1.75 to 3.47.

Algebra: Table 7.54 shows the summarized mean entry and exit levels for the major topic areas taught in first year university mathematics. The data is taken from only four courses, and generalizations and comparisons must be made with caution. However, there is a general consistency of gain across the three areas of the course. The mean gain is nearly 2 points. Entry levels for the single algèbre instructor are low, while exit levels vary between 2.0 and 3.4. Correspondence with the English instructors is high for General Algebra but gains for Linear Algebra topics are about 3.0 compared to 2.0 for the four English-speaking instructors.

Calculus and Linear Algebra: Mean entry and exit competence levels for Calculus and Linear Algebra sections of the course for the seven English instructors are given in Table 7.54. The levels are lower for French-speaking instructors, who have in general low perceptions of entry levels from year 5 courses. The general level of gain for both language groups, however, is similar.

Comparison of individual Calculus topics having low student entry levels with those in Calculus courses reveals a general similarity. Those for the last six Elementary Approach topics are a bit higher, generally between 1.0 and 1.5. Levels for subsequent topics are very alike, with 0 levels again occurring for all topics after Applications of Integration to Volume.

Topics with high entry levels are like their "Calculus only" counterparts, although fewer in number. All 15 Elementary Approach topics are rated as over 3.0 in exit competency, but only 4 Advanced

TABLE 7.53

UNIVERSITY MATHEMATICS YEAR 1
CALCULUS TOPICS FOR WHICH EXIT LEVEL IS 3.0 OR GREATER

Reference		Topic	Entry	Exit	Gain
II	2	Rate of change: slopes, secants, tangents	1.7	3.2	1.5
	3	Derivatives of powers, products and quotients	2.1	3.5	1.4
	4	Other derivatives: function of a function, trig functions	1.3	3.2	1.9
	5	Applications of derivatives to tangents to curves	1.7	3.1	1.4
	7	Second derivative and its use, cure-tracing	1.1	3.0	1.9
	8	Maxima and minima problems	1.4	3.1	1.7
	11	Areas between curves and axes	1.2	3.2	2.0
	17	Proof by induction	1.0	3.1	2.1
	22	Functions: definition algebra, composition, inverse	1.5	3.1	1.6
	24	Intermediate value	0.4	3.0	2.6
	26	Definition and algebra of derivatives	1.9	3.5	1.6
	27	Chain rule	1.4	3.3	1.9
	28*	Derivatives of elementary functions	1.9	3.4	1.5
	33	Graph sketching	1.6	3.2	1.6
	41	Trigonometric substitution	0.4	3.1	2.7
	42	Parts	0.5	3.0	2.5
	44	Area	1.2	3.1	1.9
	50	Logarithmic and exponential functions	1.1	3.0	1.9
	60	Gradient	0.7	3.3	2.7

* Also have exit level 3.0 or better in Calculus and Linear Algebra course.

TABLE 7.54

UNIVERSITY MATHEMATICS YEAR 1
ENTRY AND EXIT COMPETENCY LEVELS FOR MAJOR
TOPIC AREAS OF UNIVERSITY COURSES

	Topic Area	Entry	Exit	Gain
	ALGEBRA			
III	Year 5 Algebra	1.1	3.0	1.9
VI	Linear Algebra	0.4	2.5	2.1
V	General Algebra	0.4	2.1	1.7
	Overall	0.4	2.3	1.9
	CALCULUS AND LINEAR ALGEBRA			
II	Calculus	0.9	2.8	1.9
III	Year 5 Algebra	1.2	3.1	1.9
VI	Linear Algebra	1.4	3.0	1.6
	Overall	1.0	2.7	1.7
	BASIC MATHEMATICS			
I	Year 5 Relations and Functions	0.9	2.3	1.4
III	Year 5 Algebra	1.1	2.2	1.1
V	General Algebra	0.6	1.9	1.3
VI	Linear Algebra	0.4	1.3	0.9
	Overall	.6	2.0	1.4
	STATISTICS AND PROBABILITY			
II	Calculus	0.8	2.3	1.5
VII	Statistics and Probability	0.1	2.8	2.8
	Overall	0.3	2.6	2.3

Approach ones (#28, 33, 45, 48). Three of the Elementary Approach topics have exit levels of 3.5, and a fourth of 3.7.

Comparisons between English-speaking and French-speaking instructors for Calculus and Linear Algebra showed some similarity for year 5 Algebra topics but clear differences for topics in Section VI.

Basic Mathematics: Entry levels for Basic Mathematics topics are all 1 or less, and exit levels relatively low, a little above 2 for year 5 topics, and below 2 for university level ones.

The average gain is about 1 scale point. The figures support the view that these courses are directed toward students beginning some remediation, being made up partly of year 5 topics and partly of university topics, with only a medium expectation of exit competency.

Statistics and Probability: Entry and Exit levels for the two major topic areas involved (Calculus and Statistics and Probability) were (0.8, 2.3) and (0.1, 2.8) respectively. These figures are based on the teaching of 27 Calculus topics (11 Elementary and 16 Advanced topics) and 29 Statistics and Probability topics.

The Calculus entry levels are similar to those in the other courses in which Calculus is taught, but exit levels are lower. This is reasonable, since the major time emphasis in the courses is not on Calculus (23 percent as opposed to 75 percent or more). The very low entry level for the Statistics topics (0.08) indicate that the instructors regard these as topics being taught for the first time.

Across all five areas, competency levels show some consistencies and some variations. Entry levels for year 5 topics, as expected, are higher than those for topics commenced at university, usually by between 0.5 and 1 point. Exit levels show the same general tendency.

The general level of exit competency, in English-language courses, across the four major types of university course (Calculus, Calculus and Linear Algebra, [Linear] Algebra, and Statistics and Probability) is just below 3, being lowest for Linear Algebra. Exit levels for French-speaking instructors are lower, except in the case

of Linear Algebra where they are higher. Exit levels for Basic Mathematics are lowest of all, varying between 1.3 and 2.3.

Instructors seem to view entry levels in their speciality as lower than do other instructors who teach a course including that area but as a secondary part of the course (e.g., Elementary Calculus topics have a mean entry level of 1.1 for Calculus courses, but values about 1.6 for other courses involving Calculus. Linear Algebra instructors give an entry level of 0.4 for year 5 Algebra topics as opposed to one of 1.2 by Calculus and Linear Algebra instructors).

3. *TEACHING METHODS*

(a) *Instructional Techniques*

Lecturing was the prime method of instruction, being used on average about 65 percent of the time. The main other methods used were seminar (tutorials) and Socratic interaction. There was considerable variation, however, from course to course and various combinations of lecturing and student study such as laboratory or small group work occurred. (See Table 7.55)

(b) *Out-Of-Class Work*

Nine of 41 respondents indicated an out-of-class assignment time of less than an hour for each hour of in-class time, while 16 indicated that two hours was considered appropriate. The remaining 16 expected between one and two hours. The distribution was similar across the five categories of courses.

(c) *Provision for Individual Progress*

There was virtually no allowance for students to progress at their own rates. The only courses in which it occurred at all were the five courses classed as Basic Mathematics, where 4 instructors made some provision, 3 to a moderate extent.

(d) *Teaching Resources*

The major resource for teaching was a textbook, supplemented with mimeographed material or a second text. Other resources were used

TABLE 7.55

UNIVERSITY MATHEMATICS YEAR 1
TEACHING METHODS

Method	% of Instructors using for % Range of Time 0%	1-10%	11-20%	21-40%	41%+
Lecture	-	3%	-	10%	87%[a]
Socratic	32%	43	14%	8	3
Practically-oriented work	84	5	3	8	-
Small group activities	78	11	8	3	-
Seminar, tutorial	35	8	27	30	-
Classroom study	89	3	-	8	-
Individualized instruction	100	-	-	-	-
Testing	22	78	-	-	-
Audiovisual	89	11	-	-	-
Other	86	8	-	6	-

[a] 22% used the lecture method 41 to 50% of the time, 51% used it 51 to 75%, and 14% used it more than 75% of the time.

very little. (Table 7.56).

In English-speaking Calculus courses, 19 texts in all were used by 18 instructors. One textbook was used by 5 instructors, one by 3 and another by 2 with the first two published in 1975. The 9 remaining instructors all used different texts.

In the other categories of courses, variety was the key word, as practically all instructors used different texts.

TABLE 7.56

UNIVERSITY MATHEMATICS YEAR 1
TEACHING RESOURCES

Resources	Use by % of Instructors			
	Not At All	Small	Moderate	Great
Main text	9 %	-	14 %	77%
Main text plus supplementary text(s)	34	38%	22	6
Two or more main texts or materials from other texts	82	12	6	-
Mimeographed materials (lecture notes, etc.)	39	17	19	25
Reference books, dictionaries, encyclopedia, journals, etc.	76	21	3	-
Individualized learning packages	92	8	-	-
Laboratory and/or computer equipment	88	3	6	3
Audiovisual media (television, tapes, film strips, etc.)	91	9	-	-
Other	92	-	-	8

4. *ASSESSMENT OF STUDENT WORK*

(a) *Final Mark Allocation*

Students' final marks are based almost entirely on final exams, mid-term exams and other written tests, in that order of weight. (Table 7.57). The weight given to final examinations commonly ranges between 25 and 50 percent. Agreement is high across courses in general. Thirty-five instructors responded to the question about exemption from final examinations. None permitted it.

TABLE 7.57

UNIVERSITY MATHEMATICS YEAR 1
FINAL MARK ALLOCATION

	Allocation of Final Mark (by % Ranges)				
	0	1-20	21-40	41-50	51-75
Final examination[a]	3%	-	36%	47%	14%
Mid-term examination(s)	11	33%	53	-	3
Other written tests	25	33	34	5	3
Other oral tests	100	-	-	-	-
Individual papers (essays, reports, etc.)	97	-	3	-	-
Individual projects (e.g., oral presentations)	100	-	-	-	-
Group or team papers, projects	100	-	-	-	-
Problems, exercises	53	36	11	-	-
Notebooks	100	-	-	-	-
Laboratory and/or other class participation	97	3	-	-	-
Effort	94	6	-	-	-
Attendance	94	6	-	-	-
Other	94	3	-	-	-

[a] When respondents indicated that students could be exempted from their final examinations, the final mark allocation was determined by excluding marks assigned for the final examination. When all students were required to write the final examination it was included in the final mark allocation.

According to interview data, in 6 of the 10 universities sampled, there has been an increase in the weight given to term work in general, especially mid-terms, tests and essays.

(b) Correlations between Course Outlines and Final Examinations

Materials relating to first year university mathematics courses from 1964 to the present were received from 7 of the 10 universities studied.

Classification of the courses was extremely difficult because of the considerable variety represented, but they were generally summarized as 19 Calculus courses; 3 Calculus and Linear Algebra courses; 2

Statistics and Probability half courses; and 9 courses under the umbrella title of Basic Mathematics. Given the time constraints on the study, we were able to study in detail only materials for the 1975/6 session. In general the outlines and examination data revealed a broad range of first year offerings in the major areas of mathematics, and substantial differences in level of difficulty of courses.

Eight Calculus courses were analysed in detail, 4 of them identified as Honours courses, and where data were available, time allocations derived from course outlines were compared with those derived from the questionnaires and with final examination data. The 4 Honours courses, in particular and the other 4 courses in general show reasonable correspondence with the group of 18 Calculus courses surveyed with regard to the basic topics covered. As is to be expected, time allocation is greater in the four Honours courses for more advanced topics (Sequences and Series and Work with Differential Equations).

Analysis of final examination data for the courses for which data were available revealed some differing emphases from course to course. There is heavy emphasis in the courses on Techniques of Integration but courses differed in the amount of attention paid to Applications of Differentiation. There may be good reasons for such discrepancy. Some instructors may prefer to spend more class time on advanced topics.

The four "non-Honours" Calculus courses, the three Calculus and Linear Algebra courses, and the 6 full and 3 half courses in Basic Mathematics also differed substantially with regard to the relative emphasis placed on year 5 and University topics, and the level of difficulty of final examinations. For example, among the Basic Mathematics courses were the following, all roughly equivalent to year 5:

1) a half course in general mathematics
2) a full course dealing with Relations and Functions and Algebra
3) a sequence of two half courses on classical algebra
4) a pre-calculus course

Discussion

The survey of the population of first year (English-speaking) Mathematics courses in the universities sampled showed that 24 of 89 courses might be classed in some way as preparatory, make-up, or remedial. Of these, 15 were in the area of Basic Mathematics, 6 in Calculus, and 2 in Linear algebra. Although it was not possible to investigate them in detail, data from department heads, and the survey of course outlines indicated that substantial time and resources are devoted to "remedial" work and the servicing of students in non-specialized courses.

The quality of preparation of incoming students is clearly an important factor in the teaching of courses. Variation was perceived as great, especially by instructors of specialized courses, with dissatisfaction greatest among Calculus and Calculus and Linear algebra instructors - surprising in view of the considerable overlap in Calculus content across the interface. Skills and knowledge were the areas perceived as least satisfactory. However, information obtained in interviews with department heads indicated weakness in enthusiasm and motivation as well as problem-solving skills, with the following reasons cited: lack of drill, excessive freedom of choice, and general societal change. On the positive side, several heads indicated that the good students were better. Thus, a very similar picture to that painted for the secondary school and the college emerges.

Lecturing is the most widely used method of instruction, with tutorials, Socratic interaction, and various other supporting methods used. According to department heads, drop-in centres, teaching assistants, and use of computer programs are among the ways individual universities have tried to adapt to recent student variability and to use teaching resources more effectively.

The main text with supplementary materials is the central resource used, with much individuality of choice of text among instructors. Allowance for individual progress is virtually nonexistent except in courses in Basic mathematics, and out-of-class assignment time is normally 1 to 1½ hours for every hour of class time.

Calculus and Statistics and Probability courses tend to deal primarily with topics normally expected to lie within their disciplines. Algebra courses show a less pronounced focus, and include General algebra topics,

Calculus and Statistics and Probability courses tend to deal primarily with topics normally expected to lie within their disciplines. Algebra courses show a less pronounced focus, and include General algebra topics, which complement the major emphasis on Linear algebra. Calculus and Linear algebra courses show the expected emphasis on Calculus topics while Basic mathematics courses, the least specialized, show wider coverage across major content areas, with most emphasis placed on General algebra topics.

The substantial time allocation to year 5 topics is indicative of duplication or at least a perception of inadequate coverage. Interviews with heads of University mathematics departments confirmed that Calculus courses having a prerequisite of year 5 Calculus nevertheless "started at the begininning of the subject". Thus, there is much duplication in year 5 secondary school and first year university Calculus courses.

Similar overlap occurs in (i) Calculus and Linear algebra and (ii) Algebra courses, though not in Statistics and Probability courses. However, the question of whether the overlap is justified or not is still not clear.

The responses of the instructors indicated considerable dissatisfaction with the preparation of incoming students for Calculus and Linear algebra courses and moderate dissatisfaction with the preparation of students for Algebra and Statistics and Probability courses. In the case of areas where dissatisfaction is particularly high, such as the year 5 Calculus and year 5 Algebra topics, some duplication is obviously necessary to bring the students to a common point.

As might well be expected, there is wide variability in student competency at entry and exit, both for individual topics and groups of topics in particular courses and categories of courses. Low entry levels suggest either new topics being introduced or topics inadequately learned in earlier courses; they are more serious for topics in the latter category. Conversely, high exit levels indicate topics learned most satisfactorily. One might expect a few topics to have a value of 4 in terms of the response scale provided but few topics in any course had such a value. Possibly this is because it is the average competence of incoming students which is being evaluated. Perhaps instructors found the response scale too restrictive

although non commented to that effect.

Mean gains for categories of courses varied from 1.1 in Basic mathematics to 2.7 for Statistics and Probability and Algebra. The highest mean exit levels are 3.0 for Calculus and Linear algebra and 2.8 for Calculus.

In mathématiques courses, entry levels, exit levels, and gains are all lower than for mathematics courses. This could be related to the small number of such courses and the relative newness of the French-language system in Ontario.

THE INTERFACES

In this study, we have focussed on two substantially different interfaces: year 4 secondary school-college and year 5 secondary school-university.

The most quantitative and comprehensive data has come from questionnaires. In particular, the analysis of student-competence levels was based on the perceptions of groups of instructors in all three types of institutions using a five-point response scale to describe levels of competence achieved in the learning of mathematical topics.

Three general sets of factors which influence the transition across each interface have been identified as:

(i) Contextual or environmental factors (planning, aims, methods, evaluation, instructor variables);

(ii) Content coverage (time spent on review, on individual topics, evaluation, instructor variables);

(iii) Perceptions of actual and desired student competencies.

The Year 4 - College Interface

Comparison of a number of contextual factors such as the background of instructors, the use of resources, and teaching methods, and the relative emphasis placed on aims show no startling differences between year 4 secondary school teachers and college instructors. There was a greater tendency towards individualization in the colleges and this was reinforced by the greater emphasis given to factors such as information on future careers, and the relationship between the course taught and other courses. Evaluation policies are similar at the two levels, although greater emphasis seems to be given to term work in the colleges. Out-of-class assignment times are comparable (one out-of-class hour expected for each class hour). The trend towards greater weight being given to final examinations in the secondary school was not evident in the colleges.

The spread of topics and emphasis on them in year 4 general courses is wide, with few topics being taught by a high percentage of instructors. Basic Algebra receives the greatest emphasis, with Basic Mathematics and basic topics in quadratic, exponential and logarithmic functions also given some attention. Most topics are supposedly pre-year 4 topics. Similar variability occurred in the topics emphasized by college Business Mathematics instructors, although there was some consistency in the treatment of algebraic topics. However, the major emphasis at the college level was on Arithmetic, both Basic and Business.

Year 4 advanced courses tend to more closely follow the course as set out in Ministry of Education guidelines (22 of 36 core topics being taught as opposed to 7 out of 17 for year 4 general) and there is a higher level of consistency of coverage of individual topics by instructors as a whole. The primary content includes quadratic and trigonometric functions, and analytical geometry. College Technology courses focus mainly on Basic Algebra and the various kinds of functions, including considerable emphasis on trigonometry and some basic arithmetic. But there is considerable spread in the other topics that are taught. The relationship between year 4 advanced courses and first year college Technology mathematics courses might be described as fair.

The general impression given by the various indices (time allocation, percentages of instructors teaching topics and topic coverage) is that the year 4 general student population is heterogeneous and has some difficulty handling basic mathematics, and that many of this group requires remediation at the college level.

Although the overall quality of students taking mathematics in Technology courses is somewhat higher, it is also necessary to provide upgrading opportunities as well as review basic concepts in elementary arithmetic and algebra for many of them.

Time allocation data, amount of time spent in review, and inconsistent coverage of topics all combine to indicate that basic mathematics supposedly learned in secondary school has not been learned by many incoming students into first-year college courses.

Table 7.58 shows "transition" competency levels for college mathematics for each of the 11 topic areas. The areas of particular interest for the transition to Business Mathematics are Sections I, II, III, and V and to Technology, Sections I, III, IV, V, IX. Exit levels for year 4 general students for Sections I, III, and V do not agree well with the entry levels perceived by college Business instructors for these topic areas, as there is an apparent decrease of between 1.2 and 1.6 scale points. The same relationships hold within error limits for the transition between year 4 advanced and Technology Mathematics courses, at a slightly higher overall competency level of about 0.5 on the average. Thus both groups of college instructors have relatively similar but decidedly lower perceptions of competency levels at the interface for topics in Sections I, III and V.

Business Arithmetic is mainly of concern to college Business instructors and Trigonometry to college Technology instructors. Both topic areas show perceptions of student entry competency by college instructors which are decidedly lower than the related year 4 exit levels.

Average ratings for year 4 and Technology instructors for the separate 8-item test (Rating Validation Instruments) constructed to check the validity of using the scale for both groups yielded nearly identical average ratings, and hence no suggestion of differing perceptions of the scale. However, there was a tendency for Technology instructors to be less likely to use the extremes of the rating scale.

Thus, it appears that the discrepancy in levels is a real one. It is tempting to suggest that year 4 instructors are overly optimistic and college instructors overly pessimistic in their judgments, and that the "true" levels lie somewhere in between. This is supported to some extent by the results of the tests administered by Project II. Although the dissatisfaction of college instructors should be slightly discounted, it is, however, generally speaking, both deep and widespread.

Project II was concerned with the nature of students and their achievement. By administering tests and correlating the scores with competence levels from this project (III), aided by a categorization of

TABLE 7. 58

YEAR 4 - COLLEGE INTERFACE
"TRANSITION" MEANS FOR 11 TOPIC AREAS[a]

	Topic Area	No. of Topics	Exit Level: Year 4 General $\bar{X}$	SD	Exit Level: Year 4 Advanced $\bar{X}$	SD	Entry Level: CAAT Business $\bar{X}$	SD	Entry Level: CAAT Technical $\bar{X}$	SD
I	Basic Arithmetic	(12)[b]	2.8	1.1	3.1	1.0	1.3	1.0	1.8	1.0
II	Business Arithmetic	(12)	2.3	1.4	0.9	1.4	0.4	1.0	.4	.9
III	Basic Algebra	(22)	2.5	1.2	2.9	1.2	1.3	.9	1.4	.9
IV	Quadratic Functions and Equations	(12)	2.0	1.2	2.9	1.2	1.2	.9	1.0	.8
V	Exponential and Logarithmic Functions	(14)	2.6	.9	2.7	.9	1.0	.0	1.0	.8
VI	Sequences And Series	(5)	2.6	.9	2.7	.9	1.0	.0	1.0	.8
VII	Analytic Geometry And Vectors	(15)	1.3	1.4	2.0	1.4		.0	1.0	.8
VIII	Synthetic Geometry	(10)	.9	1.3	2.3	1.3			.9	.8
IX	Trigonometry, Complex Numbers And Statics	(18)	1.0	1.4	2.7	1.3			.9	1.0
X	Calculus	(15)	1.6	1.8	.1	1.8				
XI	Statistics and Probability	(10)	2.0	1.2	.1	1.2				
	Grand mean		2.2		2.7		1.2		1.2	
	Adjusted mean		2.4		2.8		1.2		1.3	

[a]Data from English-language courses only

[b]No. of subtopics in parentheses

the items based on teacher judgements, they identified various gaps and duplications for particular topics in secondary school mathematics curricula.

The approach taken in Project III was to assume that the topics perceived as most unsatisfactory to instructors teaching a post-secondary course were those most likely to be potential gaps or duplications either because they had not been taught previously or because they were perceived by the college instructors as having been inadequately learned.

Table 7.59 gives some examples of topics perceived as most unsatisfactory by college instructors. It appears that a number of topics which were taught by a high percentage of year 4 and college instructors are those which college instructors found least satisfactory. All are from Basic Algebra. Instructors are very dissatisfied with Fundamental arithmetic operations, Percentages, Generalized arithmetic, Working with algebraic expressions, and Linear equations and problems involving one unknown.

These are all very basic topics on which further work depends. All are taught by at least 50 percent of the year 4 general instructors. Although all of them were supposedly learned in earlier years, and have also been reviewed in year 4, student preparation in these areas is still seen as highly unsatisfactory by college instructors; college entry levels for the 4 topics shown in Table 7.59 are all at least 1 rating-scale point lower than year 4 exit levels, which indicates that the year 4 general instructors viewed the topics as relatively well learned (levels are all near 3). In Project II, analysis of test questions in 4 of the 5 topics identified Fundamental arithmetic operations with fractions, decimals and integers; Manipulating, simplifying and evaluating algebraic expressions, and Linear equations as constituting minor gaps due to inadequate learning.

If the test data is taken as objective evidence, it would appear that the actual competence levels at the interface lies between the estimates of the two groups of instructors. However, according to college questionnaire responses, 4 of 8 Business instructors spent

TABLE 7.59

YEAR 4-COLLEGE INTERFACE
COMPETENCY AT ENTRY AND EXIT ILLUSTRATED

Topic Subtopics	% Teaching			%Dissatisfaction with Entry Level		Mean Exit Level[a]	Mean Entry Level	
	Secondary School	College		College		Secondary School	College	
	Year 4G	Bus	Tech	Business	Technology	Year 4G	Business	Technology
III BASIC ALGEBRA								
2. Manipulating, simplifying and evaluating algebraic expressions.	78	43	81	43	86	3.2	1.5	1.9
3. Linear equations and word problems involving one unknown.	60	64	74	57	59	2.8	1.3	1.8
4. Systems of linear equations in 2 unknowns and applications.	56	36	74	36	74	2.8	1.6	1.7
15. Manipulation, rearrangement, evaluation of algebraic formulae.	50	36	79	36	77	2.7	0.4	1.7

[a] Entry and Exit levels ranked on a scale of: 0 - No Knowledge, 1 - Descriptive Knowledge, 2 - Elementary, 3 - Working grasp, 4 - Thorough understanding, 5 - Complete mastery

over 10 percent and 8 out of 26 Technology instructors spent over 50 percent of course time in review. This underlines how serious the dissatisfaction of college instructors with the competency of incoming students in basic mathematics is in reality.

In concluding this brief discussion, a few further points should be made. If attention is confined to topics in Sections I, III and V, over 20 percent of Business instructors are dissatisfied with entry levels in 24 of 41 topics taught and over 25 percent of Technology instructors with 48 of 53 taught.

Also if Basic Arithmetic and Basic Algebra (I, III), the major content areas covered by the Project II test, are considered, 4 of 5 Arithmetic topics tested and 7 of 8 Algebra topics tested in Project II were accorded over 25 percent dissatisfaction by both college groups in Project III. All 11 topics were taught by 50 percent or more of the year 4 general instructors. It would appear that these should be classed as inadequately learned.

Of the remaining 4 Project III content items included in the Project II test, one (Exponents) was taught by 80 percent of year 4 general instructors while the other three were taught by 33 percent or less. Two, in Analytic geometry (Derivation of various forms of the equation; Identifying, constructing and graphing a straight line) might be considered as gaps due to high college expectations, as they are not core items in the year 4 general course (though these items are core items in the year 4 advanced course). The fourth (Quadratic equations) is a core item in the year 4 general course, but was taught by only 32 percent of that group of instructors.

Clearly, whether these topics are classed as gaps or duplications, they are so basic as to merit continuing attention. It should be added that the exit-entry level discrepancy indicates the need for more reliable competency data in the form of year 4 exit tests or college diagnostic tests of agreed general validity, in order to assess student status more accurately.

Discussion should not end without brief reference to the recent study in Ontario of the mathematics curriculum in the Intermediate Division. Among its many recommendations three are particularly

relevant to the present study. They are that:

(i) structural aspects of number be de-emphasized;

(ii) a fractional (not a ratio) definition be adopted for percentage; and

(iii) the topic of percentage be studied also in year 1 of the Secondary School.

In that study, and in other recent studies by the Ontario Mathematics Commission and the Ontario Association of Mathematics Education, there is an on-going concern with the need for more emphasis on applications of mathematics. The need to integrate mathematics more with the life and world of students seems greater than ever in today's "individualistic" yet extremely complex society.

These studies seem to complement the present study, and underline some of the possible remedies to an unsatisfactory situation across the year 4 - college interface.

Year 5 - University Interface

The study indicates that, on the whole, changes in environmental factors as the year 5 student enters university to take mathematics courses are moderate in most areas.

The analysis of contextual factors did not produce any major discrepancies, although university instructors are more specialized in their interests, and teaching methods tend to polarize rather more. Class lecturing prevails in the university, yet it is accompanied by an increasing array of "student-help mechanisms". Clearly the student is less likely to be "spoon-fed" and has to fend more for himself than in secondary school. Evaluation policies focus more on examinations than the former secondary school student was probably used to, but there has been a definite move recently towards more emphasis on term work, though the final examination usually still retains a weight of 25 to 50 percent.

There is a sizable duplication of topic coverage, especially with respect to Calculus, where year 5 instructors allocate 40 percent

of their time on the average to Advanced topics, while university instructors allocate some 30 percent to Elementary (year 5) topics. It appears that the duplication is deliberate on the part of the university instructors, but it is not clear why year 5 teachers spend so much time on Advanced topics.

The phenomenon also occurred for Algebra courses, with between 25 and 45 percent of time spent on year 5 topics in 3 of the 5 university Algebra courses studied. However, this was not a case of "double overlap", since only about 5 percent of the time was allocated to university topics in the year 5 Algebra course.

These phenomena recurred in the Calculus and Linear Algebra courses, where year 5 topics received between 25 percent and 47 percent of the total time. The two French-language courses gave more emphasis to year 5 work than the English-language ones, in both Calculus and Linear Algebra, especially the latter.

Emphasis on year 5 topics was found in the other two course categories as well, being quite heavy (30 percent) on Basic Mathematics.

Year 5 exit level and first year university mean entry level competencies are given in Table 7.60 for the relevant courses. It can be seen that university instructors assign distinctly lower entry levels than the exit levels assigned by their year 5 counterparts. For Calculus, the decrease across the interface is about 1.6 points, while in Algebra it is considerably greater. University instructors rated the items on our Rating Validation Instrument lower by about .5 than did the year 5 teachers and this explains part of the difference.

Thus the differences of perception for Calculus instructors are not as serious as at first sight. However, the Algebra difference is still appreciable. It is not easy to explain this, although one contributing factor is probably the fact that year 5 Algebra instructors rarely cover any university Algebra topics. Hence, they do not have the benefit of being able to compare the difficulty levels of relevant university topics to the same extent that year 5 Calculus instructors have.

TABLE 7.60

YEAR 5 - UNIVERSITY INTERFACE
TRANSITION MEANS FOR COURSES STUDIED

	Year 5 Exit Levels					Univ. Entry Levels			
	English		French			English		French	
	$\bar{X}$	SD	$\bar{X}$	SD		$\bar{X}$	SD	$\bar{X}$	SD
Relations and Functions	3.2	.7	3.5	.7					
Calculus (El.)[a]					Calculus (El.)	1.2	.8		
(Adv.)[b]					(Adv.)	.6			
Overall	2.4	1.4	3.0	.8	Overall	.8	.9	.3	.4
Algebra	3.3	.7	3.7	1.1	Algebra (Yr. 5)	1.1	.5	.5	.5
					Overall	.4	.6	.5	.7
					Calculus and Linear Algebra	1.0	1.2	.3	.5

[a]Elementary approach topics

[b]Advanced approach topics

University Calculus instructors are generally dissatisfied with entry competence in topics taught in the year 5 Relations and Functions and Calculus courses. They show between 20 percent and 40 percent dissatisfaction with 14 year 5 topics, and over 40 percent dissatisfaction in the 7 year 5 topics. Interestingly, they show greater than 20 percent dissatisfaction with all 15 Elementary Approach Calculus topics. Moreover, they are dissatisfied with entry in 18 Advanced Approach topics, of which 7 are taught by 50 percent or more year 5 Calculus teachers.

Examples of differing perceptions for Calculus topics widely taught across the interface can be seen in Table 7.61. The six topics listed were chosen from the nine rated most unsatisfactory by the Calculus instructors. It is interesting that Inequalities, rated most unsatisfactory, and Functions (definitions, etc.) both Advanced Approach topics, were taught by low percentages of year 5 teachers, who assigned distinctly lower exit competency levels to these than to the other four Elementary Approach topics.

Comparison with the Project II year 5/university achievement test shows that of the 18 year 5 questionnaire topics tested (10 Relations and Functions and 8 Calculus), dissatisfaction greater than 20 percent occurred for 12 (4 and 8 respectively). Inverse of a function, classed as a gap in Project II had the highest percentage dissatisfaction (50 percent) in Project III. The three other Project III topics yielding highest dissatisfaction were not tested by the Project II test.

The data from Project III on dissatisfaction partially corroborates the work of Project II in that dissatisfaction was 33 percent or greater for 4 of the topics they identified as gaps. The fact that a fair level of dissatisfaction was evidenced for 4 of the 6 Calculus topics identified as duplications is possibly accounted for by the fact that these four topics all relate to basic differentiation (rate of change, derivatives of powers, products, quotients and elementary functions, and maxima and minima) and are viewed as the "basic arithmetic" of Calculus. Hence the desired level of entry competency is likely to be high.

TABLE 7.61

YEAR 5-UNIVERSITY INTERFACE
COMPETENCY AT ENTRY & EXIT ILLUSTRATED

Topic Subtopics	% teaching Secondary school Year 5	% teaching University Year 1	Dissatisfaction with Entry Level University	Competence Level Exit $\overline{X}$ Year 5	Competence Level Entry $\overline{X}$ Year 1
II CALCULUS					
1. Limit of a function: intuitive approach via sequences and series	100 %	72 %	56%	3.0	1.2
4. Other derivatives: function of a function trig. functions	98	83	50	3.3	1.3
7. Second derivative and its use, curve-tracing	100	72	44	3.2	1.1
8. Maxima and minima problems	100	78	44	3.3	1.4
18. Inequalities	20	61	61	2.0	1.2
22. Functions: definition, algebra, composition. inverse.	29	72	56	2.3	1.5

Dissatisfaction with student entry-level competence in the case of university Algebra instructors could not really be studied in view of the small number of respondents. Dissatisfaction was recorded by 3 of 4 instructors with entry-level competence in 2 topics - Systems of linear equations, and Applications of linear algebra to geometry. Thus the desired levels of student entry competence for university Algebra instructors do not differ much from those they perceive in practice and these are low.

This discussion of mismatch across the year 5-university interface suggests that even though considerable duplication of content occurs in Calculus, university instructors are generally dissatisfied with the average competence achieved in year 5 Calculus by incoming students.

Among the factors contributing to overlap on the year 5 side of the interface are textbooks which cover a good deal more advanced work in Calculus than is outlined for study in year 5. One such text was used by 46 percent of the year 5 instructors responding. There is a general concern in the mathamatics community regarding textbooks, their relationship to course outlines, their content (especially with respect to new mathamatics), of problems and applications, and to the conditions under which they are often produced.

Finally, it is heartening to note that in a recent study (Alan J. Godd, 1975), 84 percent of those responding (N=409) from the Ontario mathematics community (secondary school and university) were in favour of interaction between the schools and universities on basic skills and final examinations. The present situation, on the evidence of interviews conducted by the present study, as well as that found by Gold, is that some coordination is going on at secondary level, but that it is not general or systematic. Much more is surely needed.

8 Français

TABLE DE MATIERE

TABLE DE MATIERE (suite)

LISTE DES TABLEAUX

FRANCAIS: NIVEAU SECONDAIRE 12^{e} ET 13^{e} ANNEES

TABLEAU

FRANCAIS: NIVEAU SECONDAIRE

A. L'échantillon

L'échantillon des répondants a été choisi des quatorze écoles: 14 professeurs pour la 12^{e} année générale, 13 professeurs pour la 12^{e} année avancée et 13 professeurs pour la 13^{e} année.

Aux fins de ce rapport, nous utiliserons des symboles voisin de ceux que l'on va retrouver dans le rapport général de l'équipe de direction.

12^{e} année générale: 4G
12^{e} année avancée: 4A
13^{e} année: 5

B. Facteurs qui ont influencé l'enseignement

1. Antécédents des professeurs (voir graphique 20)

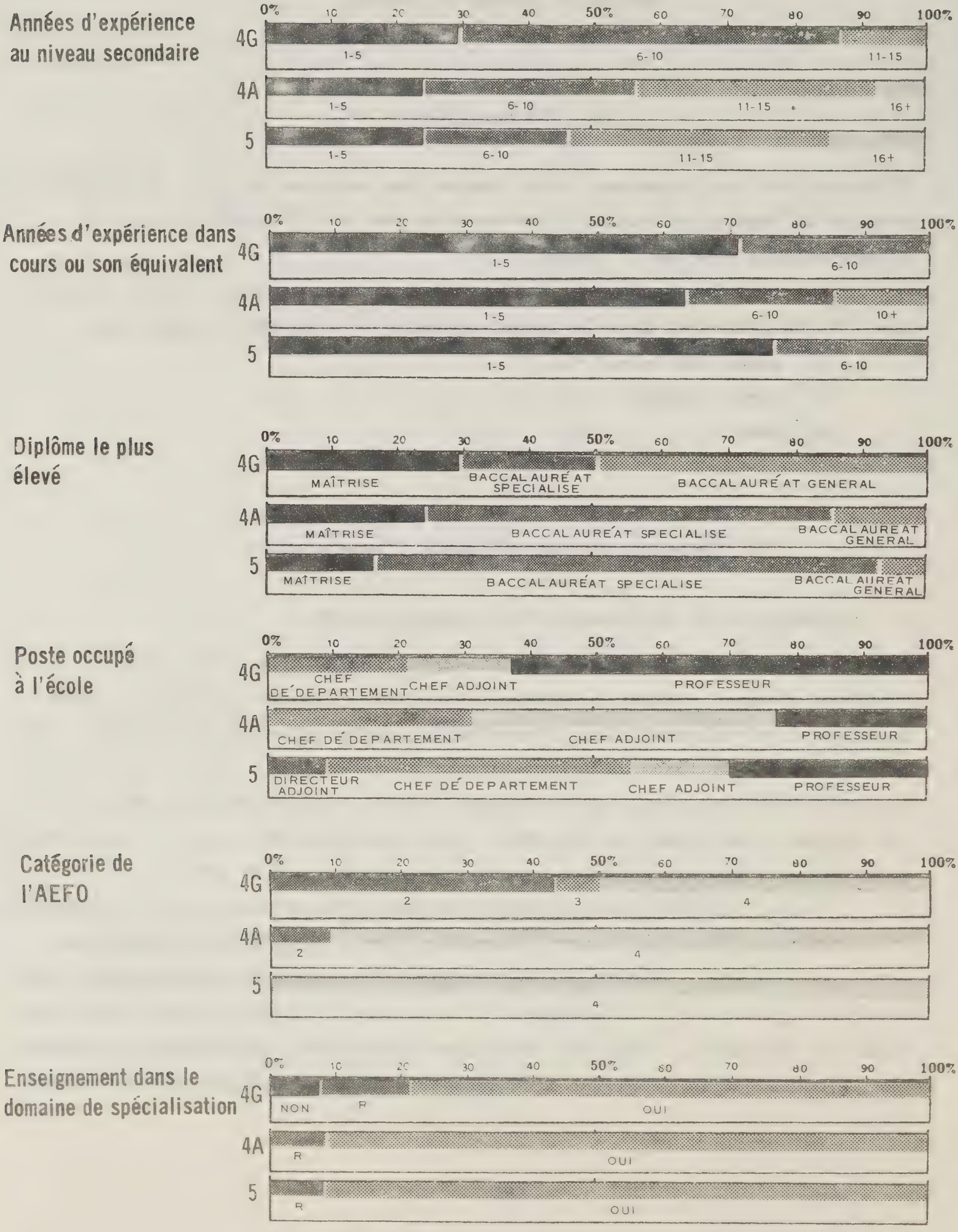
Les répondants (4G) ont une expérience appréciable, ayant même enseigné à d'autres niveaux, surtout le niveau élémentaire. Leurs diplômes sont pour la plupart pré-universitaires (Baccalauréat et Baccalauréat spécialisé), la proportion des diplômes de Maîtrise étant plutôt faible. Ils se partagent à peu près également entre les catégories 2 et 4; on retrouve cinq répondants qui occupent des postes de direction. Ils signalent enfin que le cours qu'ils enseignment s'inscrit dans leur domaine de spécialisation (79%).

Encore ici (4A), nous trouvons des gens d'expérience dans le domaine de l'enseignement; pour la plupart, toutefois, cette expérience se limite au niveau secondaire. On retrouve surtout des détenteurs de Baccalauréats spécialisés appartenant à la catégorie 4 et occupant, dans une large mesure des postes de direction. Dans une très large proportion, ces répondants estiment que le cours qu'ils décrivent a un lien avec leur domaine de spécialisation.

Graphique 20

ANTECEDENTS DES PROFESSEURS

FRANCAIS: NIVEAU SECONDAIRE
POURCENTAGE DES PROFESSEURS DANS CHAQUE CATEGORIE



Comme dans la catégorie précédante, les répondants (5) cumulent plusieurs années d'expérience, limitée surtout au niveau secondaire. La proportion des détenteurs de Baccalauréats spécialisés est la plus élevée des trois catégories. Tous appartiennent à la catégorie 4 et un peu plus de la moitié occupe des postes de direction. Ils estiment enfin que leur cours s'inscrit dans leur domaine de spécialisation.

Les trois catégories se composent donc de professeurs d'expérience occupant les échelons supérieurs dans la hiérarchie du système secondaire. Il est intéressant de noter qu'ils sont, pour la plupart, des spécialistes dans le domaine de l'enseignement du français, langue maternelle.

2. Prérequis

Dans une proportion qui est sensiblement la même pour les trois catégories, les cours étudiés lors de cette enquête comportent des prérequis (environ 2/3). C'est donc dire que dans une large mesure, ils font partie d'une continuité et se situent au terme de cette continuité.

3. Caractéristiques des étudiants

La plupart des répondants (4G) estiment que cet écart est acceptable ou négligeable. Nous observons une proportion sensiblement égale dans 4A: l'écart est acceptable ou négligeable. La proportion de ceux (5) qui estiment l'écart important augmente sensiblement.

Il est intéressant de noter qu'il y a une progression dans l'estimation de cet écart; plus on avance vers 5, plus l'écart devient important, allant de 21% à 46%.

Nous n'avons retenu pour l'analyse que les réponses de 5 puisque c'est à ce niveau qu'on estime l'écart comme étant le plus important. Il ressort de l'analyse que c'est dans les trois domaines que se situe cet écart. Certains répondants précisent que le domaine des connaissances générales est faible parce que les étudiants ont eu à "affronter" plusieurs professeurs au cours de leurs études. Au chapitre des aptitudes, on signale les difficultés des étudiants au niveau de l'expression, des connaissances grammaticales; au niveau de l'organisation de la pensée, de la compréhension d'une oeuvre littéraire et enfin de l'intégration des notions de culture générale (histoire-géographie) à l'appréciation de la littérature. Les domaines des attitudes paraît moins important, mais on a signalé la difficulté de susciter l'intérêt de l'étudiant pour une oeuvre littéraire.

La proportion des répondants qui estiment que leurs étudiants n'étaient pas suffisamment préparés reste relativement faible. (Voir tableau 8.1). Il semble donc, dans les trois années qui nous intéressent, que la vaste majorité des enseignants considère que leurs étudiants ont les capacités requises pour suivre leurs cours.

TABLEAU 8.1

FRANCAIS: NIVEAU SECONDAIRE
QUALITE DE LA PREPARATION DES ETUDIANTS AU DEBUT DU COURS

	4G	4A	5
Non, pas suffisamment	4	2	3
Oui, bien	4	5	6
Oui, assez bien	5	6	3
Oui, très bien	0	0	1
Pas de réponse	1	0	0

Nous observons ici un paradoxe. Alors que les répondants, dans une proportion appréciable, avouent que leurs étudiants étaient bien préparés à suivre leurs cours, ils livrent ici des remarques qui font croire tout le contraire. Examinons-les commentaires suivants extraits des questionnaires:

4G: "Pauvres en tout."

"Connaissances générales moyennes."

"En général, manque de connaissances générales."

"Peu d'aptitude. On aurait pu leur faire plus d'exercices de compréhension de textes."

"Il ne faut pas s'attendre à grand chose avec des élèves du cours général. Ils ne retiennent presque rien des années précédentes."

"Plusieurs étudiants n'ont aucune méthode de travail; certains ont une attitude négative envers le cours de français avant de commencer le cours."

"En résumé, ils ne sont pas là pour se perfectionner, mais pour acquérir peut-être quelques outils de survie dans la société. La plupart ne poursuivra aucune étude post-secondaire et se dirige vers le marché du travail. Au niveau pratique, tout peut marcher, au niveau théorique, c'est zéro. Pourquoi se forcer? la fin approche."

"Lacunes en grammaire, vocabulaire, phraséologie."

4A: "En général, je crois que l'attitude des élèves n'est pas assez positive et surtout, reflète un manque de responsabilité flagrant."

"Certains groupes sont bien préparés...Comment se fait-il que ceci varie d'un groupe à l'autre? A cause de notre éloignement régional des centres culturels où les acquisitions linguistiques sont meilleures, nos élèves manquent de motivation et de fierté pour bien parler leur langue. Malgré les problèmes historiques qui l'expliquent et cette situation géographique qui l'excuse, il faudrait, par des moyens que j'ignore, développer une plus grande fierté pour la langue bien parlée et bien écrite pour contrefaire l'enseignement social et familial par l'enseignement formel."

"Connaissance de la grammaire, du vocabulaire."

"Les connaissances sont souvent là, mais confuses (grammaire)."

"Les élèves ressentent le besoin de s'améliorer mais n'y mettent pas l'effort nécessaire."

5: "Si notre évaluation des connaissances de l'étudiant était plus précise et surtout exigeante, nous aurions déjà éliminé un certain nombre d'étudiants. La plupart des faillites dans mon cours sont dûes à un manque de connaissances de base de la langue française..."

"Manque fondamental de méthode."

"..manque de culture générale et de vocabulaire. Beaucoup ne savent pas lire avec compréhension (...) on a trop longtemps habitué l'étudiant aux 'leçon-bonbons'."

"Très médiocre en tout, niveau trop moyen."

"Ils (les étudiants) ne sont pas conscients de l'importance de la connaissance de la langue."

Si nous nous sommes donné la peine de transcrire ces extraits de réponses, c'est que nous croyons avoir touché ici un malaise évident à l'intérieur du système secondaire et que ces commentaires libres des répondants en illustrent toute la complexité comme le démontre le tableau 8.2.

TABLEAU 8.2

FRANCAIS: NIVEAU SECONDAIRE
POURCENTAGE DES PROFESSEURS QUI SOUHAITENT POUR LES ETUDIANTS
UN NIVEAU DE COMPETENCE PLUS ELEVE AU DEBUT DU COURS

Groupes des Objectifs	Groupes de % des Professeurs														
	4G					4A					5				
	81-100	61-80	41-60	20-40	< 20%	81-100	61-80	41-60	20-40	< 20%	81-100	61-80	41-60	20-40	< 20%
Langue (12)[a]	2[b]	4	6			11	1				7	5			
Linguistique (7)			1	6			4	1	2		1	5			
Littérature (6)	1		4	1		1	3	2			3	3			
Composition (4)			1	3		3	1				1	3			
Culture (6)			3	3			2	4			4	2			

[a] Nombre d'objectifs dans chaque groupe

[b] Nombre d'objectifs dans chaque groupe de pourcentages

Il est en effet étonnant de voir des professeurs avouer que leurs étudiants sont bien préparés pour suivre leurs cours pour ensuite se plaindre de leur manque de préparation. Nous avons même rencontré le cas d'un répondant qui après avoir dit que ses étudiants étaient bien préparés passe à la question suivante pour préciser que c'est dans le domaine des connaissances générales, aptitudes et attitudes qu'il apprécie cette préparation. Mais tout de suite après, il précise que c'est dans ces mêmes domaines que l'étudiant aurait pu être mieux préparé.

En fait, nous croyons que les répondants distinguent ici deux choses. D'une part, ils estiment qu'à l'intérieur du système actuel des écoles secondaires et en fonction des normes qu'il impose, ils considèrent que l'étudiant est bien préparé à suivre leur cours. Mais lorsqu'ils se plaignent du manque de préparation, c'est le système lui-même qu'ils critiquent: ils ne sont pas satisfaits des résultats obtenus et jugent que c'est toute la continuité qui précède leurs cours qui est à l'origine du problème. Peut-être pourrait-on expliquer ainsi le peu d'intérêt qu'ils portent à l'actuel Programme-cadre qui n'influence guère leur enseignement.

Quoi qu'il en soit, cette analyse des commentaires vient atténuer ce que les statistiques "objectives" avaient de trop absolu et révèlent l'existence d'un réel problème qui devrait retenir l'attention du Ministère. Les répondants ne cachent pas d'ailleurs leurs critiques à l'endroit des directives qui leur sont données et qui contribuent à ce manque de préparation. A preuve, les témoignages suivants de professeurs de 13^{e} année:

"Français 12^{e} année (avancée) est le prérequis. Cependant, l'orientation et/ou l'administration nous dit qu'il faut accepter les élèves qui ont un certificat de 12^{e} année, même s'ils n'ont suivi que le cours de 12^{e} année, cours <u>général</u> (4 ans) en français."

"Depuis un an, on suggère aux étudiants qui suivent le cours de littérature de s'inscrire au cours de langue; mais le cours que j'enseigne n'est pas un prérequis 'officiel'..."

"Au fond, le problème, c'est que certains étudiants s'inscrivent à un cours avancé alors qu'ils ont les connaissances et les aptitudes pour un cours général."

4. Autres facteurs (voir tableau 8.3).

TABLEAU 8.3

FRANCAIS: NIVEAU SECONDAIRE
FACTEURS QUI INFLUENCENT L'ENSEIGNEMENT DU COURS

Facteur	4G		4A		5	
	MP[a]	R	MP	R	MP	R
Intérêt des étudiants	2.6	2	2.7	1	2.5	2
Connaissance des étudiants	1.8	3	2.6	2	2.0	3
Rapport entre ce cours et d'autres cours	1.2	8	1.7	7	1.3	6
Renseignement sur l'orientation des études poursuivies par les étudiants	1.8	3	1.9	5	1.3	6
Programme-cadre du Ministère de l'éducation de l'Ontario	1.4	6	1.8	6	1.4	4
Directives données	1.3	7	1.5	8	.8	8
Intérêt pour la matière et/ou formation	2.8	1	2.5	3	2.6	1
Contenu et orientation du (des) manuel(s) de base	1.6	5	2.2	4	1.4	4

[a]MP=Moyenne pondéréé. On a utilisé un facteur de pondération pour chaque catégorie: 0-pas du tout; 1-un peu; 2-modérément; 3-beaucoup. Pour chaque article on a multiplié le nombre de réponses par le facteur de pondération et on a fait le total des produits qu'on a divisé par le nombre de répondants pour obtenir une moyenne.

[b]R=rang. On a placé les facteurs en ordre d'importance en se basant sur la moyenne pondérée.

4G: Nous retenons que c'est surtout l'intérêt du professeur pour la matière ou la formation du professeur qui domine. Nous notons que l'intèrêt de l'étudiant a joué un rôle important.

4A: La connaissance du sujet par l'étudiant et l'intérêt de l'étudiant revêtent ici une importance égale mais supérieure à l'intérêt du professeur ou sa formation. N'aurait-on pas eu avantage à différencier d'une part intérêt et intérêts et d'autre part intérêt du professeur et formation du professeur? On ne sait trop, en présence de pareilles données dans quel sens orienter son analyse.

5: De nouveau, c'est l'intérêt du professeur pour la matière ou sa formation qui semble le plus important. Et, de nouveau, même problème d'interprétation.

Retenons toutefois que si l'unanimité des répondants semble se faire autour de ces facteurs, il y en a d'autres qui ne paraissent pas entrer en jeu. On s'étonne, par exemple, de voir l'importance relativement faible accordée au Programme-cadre du Ministère de l'éducation.

C. Caractéristiques des cours

1. Objectifs généraux

Les données révèlent une tendance bien intéressante. (Voir tableau 8.4). On pourrait, au départ, classer les trois objectifs dans l'ordre d'importance suivant qui serait le même pour les trois années qui nous intéressent:

1. langue
2. littérature
3. linguistique

Ce qui varie, d'un cours à l'autre, c'est l'importance relative accordée à chacun de ces objectifs. En 4G, l'élément langue domine nettement; on s'intéresse peu à la littérature et quand on le fait, c'est surtout l'analyse du contenu culturel du texte littéraire qui retient l'attention. Quant à la linguistique, son importance est minimale.

En 4A, c'est toujours l'élément langue qui ressort en premier lieu mais l'importance accordée à la littérature augmente sensiblement, avec un accent particulier sur la formation du goût littéraire. L'accent sur la linguistique reste minimal.

En 5 enfin, c'est encore l'élément langue qui domine, surtout le niveau de l'expression écrite. En second lieu vient la littérature mais cette fois-ci ce sont toutes les composantes qui retiennent l'attention. C'est donc dire

TABLEAU 8.4

FRANCAIS: NIVEAU SECONDAIRE
IMPORTANCE ACCORDEE AUX OBJECTIFS GENERAUX PAR LES PROFESSEURS

	4G		4A		5	
	MP[a]	R[b]	MP	R	MP	R
Linguistique						
1. Acquisition des principes fondamentaux de la science linguistique	.6	10	.7	11	.8	11
2. Eveil de la conscience linguistique	.6	10	1.2	10	1.0	10
3. Connaissance des mécanismes de la langue	1.1	8	1.5	9	1.5	9
Langue						
4. Savoir parler	2.8	2	2.8	2	2.4	2
5. Savoir écouter	2.5	4	2.2	5	1.9	5
6. Savoir lire	2.7	3	2.6	3	2.1	3
7. Savoir écrire	2.9	1	2.9	1	2.7	1
Littérature						
8. Analyse du fonctionnement des mécanismes linguistiques propres au texte littéraire	1.1	8	1.6	8	2.0	4
9. Analyse des arrangements artistiques du texte littéraire	1.4	7	2.0	7	1.7	8
10. Analyse du contenu culturel du texte littéraire	1.9	5	2.2	5	1.8	6
11. Formation du goût littéraire	1.9	5	2.5	4	1.8	6

[a] MP=Moyenne pondérée. On a utilisé un facteur de pondération pour chaque catégorie: 0-pas du tout; 1-un peu; 2-modérément; 3-beaucoup. Pour chaque article on a multiplié le nombre de réponses par le facteur de pondération et on a fait le total des produits qu'on a divisé par le nombre de répondants pour obtenir une moyenne.

[b] R=rang. On a placé les facteurs en ordre d'importance en se basant sur la moyenne pondérée.

que les études littéraires en arrivent ici à un développement plus harmonieux. Le domaine de la linguistique retient aussi l'attention mais son importance, bien que supérieure en 5 reste relativement faible. Nous nous demandons d'ailleurs dans quelle mesure une partie de la linguistique n'est pas absorbée dans la langue. On remarque en effet que c'est presque toujours le domaine des connaissances des mécanismes de la langue qui retient l'attention des répondants et que ces mêmes répondants accordent une importance considérable à l'enseignement de la langue. C'est donc dire qu'ici la linguistique est au service de la langue, ce qui nous paraît non seulement normal mais aussi hautement souhaitable.

2. Objectifs spécifiques, et distribution du temps

Le tableau 8.5 indique le temps consacré par les professeurs à chacun des objectifs spécifiques. Le tableau 8.6 indique la moyenne du niveau de compétence des étudiants au début et à la fin du cours, de même que le pourcentage des professeurs qui tiennent compte de ces objectifs. Il semble évident que la façon d'envisager l'enseignement au sec. 4G diffère grandement d'un professeur à l'autre quoiqu'on insiste généralement sur les capacités linguistiques. Il y a une plus grande uniformité au sec. 5 alors que les professeurs tiennent compte de tous ces objectifs, attachant cependant une plus grande importance aux objectifs ayant trait à la littérature.

Les cours de sec. 4A diffèrent quelque peu d'une école à l'autre. La tendance générale démontre qu'on s'adonne surtout à l'étude de la langue et de la littérature dans une proportion de 60% et 40% respectivement.

3. Techniques et méthodes d'enseignement (voir tableau 8.7)

(a) Techniques d'enseignement

4G: (i) Les techniques suivantes ne sont que très peu utilisées: exercices de traduction, enseignement individualisé, excursions et jeux, simulations.

(ii) Les techniques suivantes sont beaucoup plus exploitées: travail en petits groupes et cours magistral.

4A: (i) Les techniques suivantes ne sont que très peu utilisées: exercices de traduction, enseignement individualisé, travail de laboratoire et jeux, simulations.

TABLEAU 8.5

FRANCAIS: NIVEAU SECONDAIRE
DISTRIBUTION DU TEMPS PAR MATIERE

Objectif	4G				4A				5			
	0%[a]	1-5%	6-10%	11+%	0%	1-5%	6-10%	11+%	0%	1-5%	6-10%	11+%
Langue												
Etudes des éléments fondamentaux de la langue:												
.orthographe	0	7[b]	5	2	0	10	2	1	1	10	1	1
.vocabulaire	1	10	2	1	0	12	1	0	3	10	0	0
.grammaire	0	5	4	5	0	7	4	2	2	6	4	1
.stylistique (structures de phrases, phraséologie etc.)	2	8	4	0	1	10	2	0	0	9	4	0
Travaux écrits:												
.compréhension du sujet	3	8	3	0	1	10	2	0	2	11	0	0
.organisation	5	9	0	0	0	11	2	0	2	10	1	0
.rédaction	1	8	4	1	1	10	2	0	3	7	2	1
.analyse et commentaire de textes	10	3	1	0	1	12	0	0	3	7	3	0
Expression orale:												
.prononciation	7	6	0	1	4	8	1	0	3	10	0	0
.lecture expressive	5	9	0	0	4	9	0	0	6	7	0	0
.expression spontanée	6	8	0	0	2	10	1	0	5	8	0	0
.exposés	3	11	0	0	1	9	3	0	2	8	1	2

[a] Pourcentage du temps consacré

[b] Nombre de professeurs dans chaque catégorie

TABLEAU 8.5 (suite)

FRANCAIS: NIVEAU SECONDAIRE
DISTRIBUTION DU TEMPS PAR MATIERE

Objectif	4G				4A				5			
	0%	1-5%	6-10%	11+%	0%	1-5%	6-10%	11+%	0%	1-5%	6-10%	11+%
Linguistique												
Principes généraux	12	2	0	0	6	7	0	0	8	4	0	1
Domaines:												
.phonétique	13	1	0	0	8	5	0	0	8	5	0	0
.phonologie	13	1	0	0	8	5	0	0	10	2	1	0
.morphologie	11	2	1	0	6	7	0	0	9	3	1	0
.syntaxe	10	2	2	0	7	6	0	0	8	3	1	1
.sémantique	11	3	0	0	6	7	0	0	7	5	1	0
.lexicologie	11	2	1	0	7	6	0	0	9	3	1	0
Littérature												
Etude de textes:												
.poèmes	8	6	0	0	3	10	0	0	4	9	0	0
.romans	5	3	3	3	1	3	7	2	3	4	5	1
.théâtre	4	4	5	1	2	4	6	1	4	8	0	1
.essais	13	1	0	0	6	7	0	0	8	5	0	0
Explication de textes:												
.orale	5	8	1	0	4	8	1	0	2	9	2	0
.écrite	3	8	3	0	0	12	0	1	3	8	2	0

TABLEAU 8.5 (suite)

FRANCAIS: NIVEAU SECONDAIRE
DISTRIBUTION DU TEMPS PAR MATIERE

Objectif	4G				4A				5			
	0%	1-5%	6-10%	11+%	0%	1-5%	6-10%	11+%	0%	1-5%	6-10%	11+%
Composition:												
.analyse littéraire	12	2	0	0	4	9	0	0	1	12	0	0
.commentaire de textes	8	5	1	0	5	7	1	0	3	8	1	1
.dissertations	10	4	0	0	1	5	6	1	4	5	2	2
.rédactions diverses	4	6	4	0	1	9	2	1	5	5	2	1
Culture												
Connaissance de l'héritage littéraire et culturel:												
.poèmes	9	5	0	0	6	7	0	0	4	9	0	0
.romans	5	7	2	0	4	8	1	0	3	9	1	0
.contes	9	5	0	0	8	5	0	0	6	7	0	0
.théâtre	7	6	1	0	6	7	0	0	4	9	0	0
.films	8	4	2	0	7	6	0	0	5	8	0	0
.chansons	5	9	0	0	4	9	0	0	5	8	0	0

TABLEAU 8.6

FRANCAIS: NIVEAU SECONDAIRE

NIVEAU DE COMPETENCE MOYENNE A L'ENTREE ET A LA SORTIE DU COURS

Objectifs spécifiques	4G					4A					5				
	Professeurs qui Enseignent	Niveau Actuel				Professeurs qui Enseignent	Niveau Actuel				Professeurs qui Enseignent	Niveau Actuel			
		A l'entrée		A la sortie			A l'entrée		A la sortie			A l'entrée		A la sortie	
	%	$\bar{X}$[a]	s	$\bar{X}$	s	%	$\bar{X}$	s	$\bar{X}$	s	%	$\bar{X}$	s	$\bar{X}$	s
Langue															
Etude des éléments fondamentaux de la langue:															
.orthographe	86	.6	.5	1.9	1.0	92	.8	.6	2.5	.9	85	1.0	.9	2.2	1.4
.vocabulaire	64	1.0	.7	1.9	1.1	85	1.0	.6	2.2	1.0	77	1.2	.6	2.5	1.1
.grammaire	64	.6	.5	1.6	1.4	92	.8	.7	2.2	1.0	85	.5	.7	2.0	1.4
.stylistique (structures de phrases, phraséologie, etc.)	71	.5	.5	1.6	1.4	92	.9	.3	2.5	.9	85	.9	.7	2.5	.9
Travaux écrits:															
.compréhension du sujet	64	1.2	.8	2.3	.9	92	1.3	.5	2.5	.8	77	1.4	.7	2.8	.8
.organisation	71	.9	.9	2.0	1.1	100	.8	.8	2.5	.9	85	2.5	.7	2.7	.8
.rédaction	86	.4	.6	1.9	1.4	100	1.1	.5	2.5	.5	69	1.3	.8	2.5	1.4
.analyse et commentaire de textes	71	.4	.5	1.5	1.3	85	.8	.8	2.4	.9	92	.8	.9	2.3	1.3
Expression orale:															
.prononciation	64	1.1	.9	2.0	1.4	77	1.0	.6	2.3	.8	85	1.3	.8	2.6	.9
.lecture expressive	64	1.0	.6	2.2	1.0	77	.9	.5	2.3	1.0	85	1.0	1.2	2.6	1.0
.expression spontanée	79	1.1	.9	2.1	1.1	77	1.2	.7	2.5	1.2	69	1.5	1.2	2.6	1.4
.exposés	64	.9	.9	1.7	1.1	92	1.2	.8	2.5	.8	85	1.5	1.1	3.1	1.0

[a] Les données de ce tableau se rapportent à l'échelle des réponses qui varie de zéro (niveau inacceptable) à 7 (niveau idéal).

TABLEAU 8.6 (suite)

FRANCAIS: NIVEAU SECONDAIRE
NIVEAU DE COMPETENCE MOYENNE A L'ENTREE ET A LA SORTIE DU COURS

Objectifs spécifiques	4G					4A					5				
	Professeurs qui enseignent	Niveau actuel				Professeurs qui enseignent	Niveau actuel				Professeurs qui enseignent	Niveau actuel			
		A l'entrée		A la sortie			A l'entrée		A la sortie			A l'entrée		A la sortie	
	%	X	s	X	s	%	X	s	X	s	%	X	s	X	s
Linguistique															
Principes généraux	29	.1	.3	.4	.6	62	.3	.5	1.9	.7	38	.7	.5	2.7	1.8
Domaines:															
.phonétique	21	.3	.5	1.5	1.0	46	.6	.5	1.7	.5	23	.8	.4	2.8	2.0
.phonologie	21	.2	.4	1.0	.8	46	.5	.5	1.8	.8	15	.3	.6	2.7	2.9
.morphologie	36	.3	.5	1.4	1.1	46	.9	.8	1.8	1.2	38	.6	.5	2.6	1.9
.syntaxe	36	.9	.7	1.6	1.6	62	1.0	.5	2.4	.9	54	1.0	.6	3.0	1.6
.sémantique	29	.7	.8	1.8	1.9	62	.9	.6	2.3	1.0	46	1.0	.0	3.0	1.5
.lexicologie	29	1.0	.7	2.2	1.7	46	.7	.5	2.0	.9	38	.6	.5	2.8	1.9
Littérature															
Etude de textes:															
.poèmes	43	.6	.5	1.6	1.1	85	.8	.6	2.0	1.1	77	1.3	.7	2.9	1.0
.romans	71	1.2	1.0	2.3	1.1	100	1.5	.8	3.2	1.0	69	1.7	.9	2.5	1.6
.théâtre	79	1.3	1.0	2.3	.9	85	1.3	.9	2.8	1.2	69	1.5	.8	2.3	1.5
.essais	21	.5	.5	1.0	.9	54	.3	.5	1.4	1.7	62	1.3	.5	1.9	1.8
Explication de textes:															
.orale	50	.8	.4	1.5	.5	69	1.0	.7	1.8	1.5	77	1.4	.9	2.3	1.5
.écrite	50	.8	.4	1.5	.7	92	1.0	.6	2.5	1.2	100	1.4	.7	3.2	.9

TABLEAU 8.6 (suite)

FRANCAIS: NIVEAU SECONDAIRE

NIVEAU DE COMPETENCE MOYENNE A L'ENTREE ET A LA SORTIE DU COURS

Objectifs spécifiques	4G					4A					5				
	Professeurs qui enseignent	Niveau actuel				Professeurs qui enseignent	Niveau actuel				Professeurs qui enseignent	Niveau actuel			
		A l'entrée		A la sortie			A l'entrée		A la sortie			A l'entrée		A la sortie	
	%	$\overline{X}$	s	$\overline{X}$	s	%	$\overline{X}$	s	$\overline{X}$	s	%	$\overline{X}$	s	$\overline{X}$	s
Composition:															
.analyse littéraire	21	.3	.5	.7	1.2	69	.5	.7	1.8	1.5	92	1.1	.9	3.0	1.4
.commentaire de textes	29	.7	.5	1.3	.8	85	.8	.6	2.1	1.2	77	1.4	1.0	2.5	1.6
.dissertations	29	.1	.4	.9	.9	100	.7	.8	2.6	1.2	69	1.4	1.1	2.3	1.7
.rédactions diverses	64	.8	.5	2.0	1.0	100	1.2	.6	2.8	.9	85	1.6	1.0	2.8	1.4
Culture															
Connaissance de l'héritage littéraire et culturel:															
.poèmes	29	.6	.5	1.4	1.3	46	.5	.7	1.0	1.2	77	.9	.7	2.0	1.3
.romans	57	.8	.4	1.9	.9	69	.8	.8	1.8	1.4	77	1.1	.7	2.3	1.5
.contes	57	.7	.7	1.9	1.5	46	.6	1.0	1.2	1.2	69	.7	.5	2.1	1.6
.théâtre	64	.7	.5	2.1	1.0	62	.9	.7	1.5	1.3	77	1.0	.4	2.2	1.2
.films	50	.8	.5	1.6	.7	46	.5	.5	1.2	1.2	54	.9	.3	1.5	1.3
.chansons	50	.6	.5	1.7	1.3	54	1.0	.5	1.5	1.1	54	1.4	.7	1.8	1.8

TABLEAU 8.7

FRANCAIS: NIVEAU SECONDAIRE
POURCENTAGE DU TEMPS CONSACRE AUX TECHNIQUES ET METHODES D'ENSEIGNEMENT

	4G					4A					5				
	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%
Cours magistral (suivi ou non d'une discussion)	1[a]	3	3	7	-	-	5	3	4	1	-	6	1	3	3
"Maïeutique" (méthode suscitant la réflexion au moyen de questions appropriées)	1	8	3	1	1	-	2	8	1	2	-	6	4	2	1
Travail en petits groupes (sous la surveillance du professeur)	-	6	5	-	3	-	10	3	-	-	4	6	2	1	-
Séminaire (travail d'un seul groupe dirigé ou non par un professeur; cette technique peut comprendre des exposés d'étudiants)	9	5	-	-	-	4	8	1	-	-	3	7	2	-	1
Travail individuel (les étudiants font en classe le travail requis pour le cours et reçoivent, au besoin, une aide supplémentaire du professeur; vous pouvez inclure ici le travail à la bibliothèque ou au centre de documentation)	-	8	5	1	-	1	9	3	-	-	-	8	4	-	1
Enseignement individualisé (chaque étudiant travaille à son propre rythme; par exemple, enseignement programmé, modules d'apprentissage)	11	3	-	-	-	11	2	-	-	-	11	2	-	-	-
Jeux, simulations	10	4	-	-	-	11	2	-	-	-	11	2	-	-	-
Exposés d'étudiants	3	10	1	-	-	1	11	1	-	-	5	7	1	-	-
Tests	-	10	4	-	-	-	10	3	-	-	-	9	4	-	-
Dictées (tests exclus)	2	11	1	-	-	1	10	1	1	-	4	8	-	1	-

[a]Nombre des professeurs

TABLEAU 8.7 (suite)

FRANCAIS: NIVEAU SECONDAIRE
POURCENTAGE DU TEMPS CONSACRE AUX TECHNIQUES ET METHODES D'ENSEIGNEMENT

	4G					4A					5				
	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%
Exercices de traduction (tests exclus)	13	1	-	-	-	11	2	-	-	-	12	1	-	-	-
Recherches à la bibliothèque (avec le professeur, en vue de travaux pour la classe et non d'un travail individuel)	8	6	-	-	-	7	6	-	-	-	5	8	-	-	-
Techniques audio-visuelles (télévision, magnétophone, cinéma, radio, etc.)	6	7	1	-	-	4	8	1	-	-	2	11	-	-	-
Excursions, rencontres avec des personnes invitées	10	4	-	-	-	8	5	-	-	-	7	6	-	-	-
Présentations théâtrales (pièces, extraits de pièces, jeux de scène, etc.)	9	5	-	-	-	5	8	-	-	-	7	6	-	-	-

(ii) Les techniques suivantes sont beaucoup plus exploitées: maïeutique, cours magistral, travail en petits groupes, travail individuel et tests.

5: (i) Les techniques suivantes ne sont que très peu utilisées: exercices de traduction, travail de laboratoire, jeux, simulations et enseignement individualisé.

(ii) Les techniques suivantes sont beaucoup plus exploitées: cours magistral, maïeutique, travail en petits groupes et travail individuel.

Il semble donc y avoir un accord quasi-unanime dans les trois cours en ce qui concerne à la fois les techniques et méthodes non-utilisées et celles qui retiennent l'attention des répondants.

(b) Pourcentage de temps accordé au cours en dehors des heures de classe

Les données de l'enquête montrent que plus on avance dans la hiérarchie (4G, 4A, 5) plus le nombre d'heures consacrées au cours en dehors de la classe augmente. Cependant il y a une grande variation d'un professeur à l'autre.

(c) Temps consacré à la révision

Sauf pour 4G où la proportion est plus importante, on accorde sensiblement la même proportion au temps consacré à la révision, soit entre 10% et 25%.

(d) Enseignement modulaire

Dans ces cours, l'enseignement s'adresse à la classe comme entité. Un petit nombre seulement de professeurs organisent leur enseignement de façon à répondre aux besoins individuels des étudiants.

(e) Matériel pédagogique (voir tableau 8.8)

Voici le matériel le plus important, par ordre d'importance décroissante:

4G: manuel de base, autre matériel de classe, manuel de base et manuel(s) supplémentaire(s) et sources secondaires.

4A: manuel de base, deux manuels de base ou plus de deux, ou des extraits d'autres manuels, sources secondaires et manuel de base et manuels supplémentaires.

TABLEAU 8.8

FRANCAIS: NIVEAU SECONDAIRE
MATERIEL PEDAGOGIQUE

	4G					4A					5				
	Beau-coup	Modéré-ment	Un peu	Pas du tout	Item non pertinent	Beau-coup	Modéré-ment	Un peu	Pas du tout	Item non pertinent	Beau-coup	Modéré-ment	Un peu	Pas du tout	Item non pertinent
Manuel de base	6[a]	5	1	1	1	7	1	2	2	1	6	1	-	4	2
Manuel de base et manuel(s) supplémentaire(s)	3	8	1	1	1	4	2	4	1	2	4	2	4	2	1
Deux manuels de base ou plus de deux, ou des extraits d'autres manuels	2	5	2	4	1	6	2	2	1	2	5	1	1	5	1
Sources secondaires (livres de référence, dictionnaires, encyclopédies, etc.)	3	7	4	-	-	5	6	2	-	-	8	3	1	1	-
Publications et revues savantes	-	1	6	7	-	-	2	7	3	1	2	1	5	3	2
Ensembles d'enseignement individualisé (séries programmées, modules d'apprentissage)	1	-	1	12	-	1	-	-	11	1	-	-	3	8	2
Autre matériel de classe (journaux, revues, brochures, etc.)	4	1	5	4	-	-	2	9	2	-	2	2	7	1	1
Matériel audiovisuel (télévision, cinéma, magnétophone, etc.)	-	4	7	3	-	-	5	7	1	-	1	3	5	2	2
Matériel de laboratoire	-	-	1	13	-	-	-	-	12	1	-	-	1	7	5

[a]Nombre des professeurs qui ont répondu.

5: sources secondaires, manuel de base, deux manuels de base ou plus de deux, ou des extraits d'autres manuels, et manuel de base et manuel(s) supplémentaire(s).

L'importance accordée ici aux manuels est évidente. Notons toutefois qu'en 5, ces matériaux revêtent une importance réduite. On accorde, en effet, une attention particulière aux textes littéraires. Il n'en reste pas moins que le manuel de base reste une source très exploitée.

4. Evaluation du travail des étudiants

(a) Examen final

Dans des proportions sensiblement identiques, les répondants des trois catégories estiment que leurs cours comportent des dispenses à l'examen final (1/3). De même, une proportion semblable (1/3) indique que leurs cours ne comportent pas d'examen final. Seulement 1/3 environ des répondants utilisent l'épreuve d'un examen final.

(b) Composantes de la note finale (voir tableau 8.9)

On retiendra que les composantes les plus importantes sont les suivantes, en ordre d'importance décroissante:

4G: autres tests écrits, travaux écrits individuels et exercices.

4A: examens semestriels, travaux écrits et autres tests écrits.

5: examens semestriels, travaux écrits individuels et autres tests écrits.

Fait intéressant à noter, c'est que plus on avance dans la hiérarchie, plus l'importance de contrôles des connaissances s'accroît. De même, c'est en 5 que l'examen final revêt la plus grande importance.

TABLEAU 8.9

FRANCAIS: NIVEAU SECONDAIRE
ALLOCATION DE LA NOTE FINALE

Item	Allocation de la Note Finale (par groupes de pourcentage)														
	4G					4A					5				
	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%	0%	1-10%	11-20%	21-30%	31+%
Examens de fin d'année*	14	–	–	–	–	13	–	–	–	–	9	–	2	1	1
Examens semestriels	8	–	3	1	2	5	–	1	4	3	5	–	2	1	5
Autres tests écrits	2	3	4	1	4	–	–	6	5	2	–	2	6	2	3
Autres tests oraux	7	4	3	–	–	8	4	1	–	–	8	4	1	–	–
Travaux écrits individuels (dissertations, rapports, compte rendus, etc.)	2	2	7	3	–	–	1	5	6	1	–	2	6	2	3
Travaux écrits de groupe ou d'équipe	8	4	2	–	–	6	6	1	–	–	9	3	1	–	–
Projets individuels (à l'exclusion des dissertations, rapports, etc.)	7	5	1	1	–	7	6	–	–	–	7	6	–	–	–
Projets de groupe ou d'équipe	7	5	1	1	–	7	5	1	–	–	10	2	1	–	–
Exercices	3	6	4	1	–	6	5	2	–	–	8	4	1	–	–
Cahiers	12	1	1	–	–	12	1	–	–	–	11	2	–	–	–
Participation en classe et/ou au laboratoire	7	5	2	–	–	5	6	1	1	–	6	6	1	–	–
Efforts	9	4	1	–	–	7	6	–	–	–	9	4	–	–	–
Présence	13	1	–	–	–	11	2	–	–	–	12	1	–	–	–
Exposés individuels (discours préparés ou spontanés)	4	8	2	–	–	2	7	4	–	–	5	7	–	–	1
Présentations théâtrales en groupe	13	1	–	–	–	12	1	–	–	–	12	1	–	–	–

*Dans le cas où les répondants ont indiqué que les étudiants pouvaient être excusés de l'examen final, on a obtenu la note finale en excluant la note de l'examen final. Là où tous les étudiants devaient écrire l'examen final, cette note a été incluse dans la note finale.

FRANCAIS: LES COLLEGES COMMUNAUTAIRES

A. L'échantillon

Dans le cas des collège communautaires l'échantillon coincide presque avec la population.

On évaluera mieux d'autre part la situation particulière des collèges communautaires bilingues en consultant le Rapport d'orientation du département de français du Collège Algonquin qui regroupe à lui seul plus de 70% des étudiants francophone de la province*. Ce document important précise très clairement les besoins des étudiants et l'orientation que cette institution à su donner à ses enseignements. Nous aurons l'occasion de revenir sur ces particularités plus loin dans ce rapport.

B. Facteurs qui ont influencé l'enseignement

1. Antécédents des professeurs

L'échantillon ne se compose que de trois professeurs dont un seul détient la maîtrise. Ce sont des gens d'expérience ayant enseigné au niveau secondaire et même universitaire. Ils ont peu d'expérience connexe et croient que le cours qu'ils enseignent a un lien avec leur domaine de spécialisation.

2. Prérequis

Aucun des cours de l'échantillon ne comporte de prérequis.

3. Caractéristiques des étudiants

(a) Ecart entre les étudiants sur le plan individuel

La quasi-totalité des répondants estiment que cet écart est important.

---

*On consultera aussi avec profit le Rapport Bordeleau-Desjardins sur l'avenir des étudiants franco-ontariens de 12^e^ et 13^e^ année. (voir Bibliographie).

En plus du domaine des connaissances générales, on relève celui de la connaissance de la grammaire et celui de l'attitude envers le cours de français. Ces écarts peuvent varier selon le programme.

(b) Les étudiants étaient-ils bien préparés?

La question paraît peu pertinente au niveau collégial: il ne peut être question de préparation à un cours qui se définit en fonction des besoins des étudiants. Les remarques des répondants sont intéressantes:

> "Nous avons créé un cours qui convient à n'importe quel étudiant francophone de la région."
>
> "Pas question d'avoir été préparé au cours puisque le cours se situe à un niveau tellement élémentaire."

Les répondants estiment les étudiants mals préparés et un seul note une amélioration dans l'attitude envers le cours de français depuis deux ans. C'est à tous les niveaux (connaissances générales, aptitudes et attitudes) qu'on souhaite une amélioration. Le commentaire suivant nous paraît important:

> "Nous croyons que ce genre ce cours existe parce que le travail de grammaire n'a pas été fait auparavant et nous n'avons donc pas de choix. Si l'étudiant doit faire des progrès en français il doit posséder la base."

4. Autres facteurs

Les facteurs suivants n'influencent pas l'enseignement du cours: programme-cadre du Ministère, directives et manuels de base.

Les facteurs suivants, classés par ordre d'importance décroissante ont une influence sur l'enseignement du cours: connaissance du sujet par les étudiants, intérêt des étudiants, et intérêt du professeur pour la matiére/formation du professeur.

Deux des cours de l'échantillon comportent un test d'aptitude linguistique dont les résultats déterminent le contenu du cours. Il s'agit donc d'un facteur important pouvant influencer l'enseignement. Selon les résultats de ce test d'évaluation des connaissances en français, les étudiants sont regroupés selon leur niveau et leurs besoins. Il y a donc ici une adaptation du contenu du cours au niveau des étudiants.

C. Caractéristiques des cours

1. Objectifs généraux

Les réponses obtenues à cette partie du questionnaire font nettement ressortir l'importance qu'on accorde à l'enseignement de la langue. C'est surtout le "savoir écrire" qui intéresse les répondants, mais les autres objectifs sous la rubrique langue (savoir parler, savoir écouter, savoir lire) ne sont pas sans importance: ils viennent tout simplement en second lieu.

Cet accent sur l'apprentissage avancé de la langue se nourrit d'enseignements linguistiques - c'est d'ailleurs la tendance aujourd'hui: c'est le domaine de la grammaire qui a été un des premiers à profiter du savoir linguistique - et l'on ne s'étonnera pas si les répondants ont choisi l'éveil de la conscience linguistique comme objectif secondaire. Le seul objectif à avoir été éliminé est celui de la littérature: rien d'étonnant puisqu'il semble inutile de proposer l'analyse et la réflexion littéraires à des étudiants dont les capacités d'expression sont telles qu'ils ne seraient pas en mesure de bénéficier de ce type d'enseignement.

Il faut aussi songer à la vocation particulière des Collèges communautaires: il importe que les étudiants qui y sont formés et qui se destinent au marché du travail puissent d'abord s'exprimer efficacement en français: c'est dans leur milieu de travail qu'ils auront à s'actualiser et une solide maîtrise de leur langue maternelle leur sera sûrement plus utile que des connaissances littéraires.

Nous croyons donc que les objectifs des cours de première année, tels que décrits par les répondants dans le questionnaire correspondent bien aux préoccupations des collèges communautaires et découlent des besoins spécifiques des étudiants.

2. Objectifs spécifiques

(a) Contenu des cours

Les seuls objectifs spécifiques qui retiennent l'attention des répondants sont groupés sous les rubriques langue et linguistique. Les deux autres objectifs, littérature et culture ont été systématiquement éliminés ou déclarés non-pertinents.

Au chapitre de la langue, les objectifs suivants se révèlent les plus importants: étude des éléments fondamentaux de la langue et travaux écrits.

On accorde, d'autre part, beaucoup moins d'importance à la rubrique "Expression orale". En général, les répondants estiment que les étudiants ont, dans le domaine de la langue, une très mauvaise préparation; les niveaux sont souvent inacceptables, quel que soit l'objectif. Ce qui étonne, c'est le niveau atteint en fin de cours qui semble très faible, lui aussi, ne dépassant guère le niveau acceptable. La préparation des étudiants serait-elle à ce point mauvaise qu'une année d'enseignement ne suffit pas à corriger, de façon plus satisfaisante, ces lacunes au niveau de l'expression?

Les répondants aimeraient, par contre, commencer leur enseignement avec des étudiants ayant atteint un niveau tout au moins acceptable et dans ces conditions estiment pouvoir les amener à un niveau dépassant le seuil très acceptable.

Dans le domaine de la linguistique, les étudiants arrivent avec une préparation nulle. Il ne saurait être question de niveau inacceptable ici puisque la linguistique, en tant que telle, n'est pas une matière inscrite au programme des écoles secondaires. Le niveau atteint en fin de cours est acceptable et ne dépasserait guère ce niveau dans des conditions dites idéales. Cela montre, en fin de compte, le caractère secondaire de la composante linguistique dans l'enseignement de la langue: on veut bien faire de la linguistique, mais seulement dans la mesure où celle-ci est au service du perfectionnement de la langue.

(b) Distribution du temps

La ventilation des objectifs en fonction du temps qu'on leur accorde ne revêt pas de signification dans le cas des Collèges communautaires. Comme un des répondants le fait justement remarquer, les étudiants étant regroupés selon leur compétence linguistique, la distribution des pourcentages va varier en conséquence. Nous avons toutefois remarqué que la distribution du temps coïncidait avec les objectifs prioritaires (langue) et secondaires (linguistique). Signalons enfin que l'objectif littérature ayant été jugé non-pertinent, il en va de même pour la répartition entre littérature française, canadienne et étrangère.

3. Techniques et méthodes d'enseignement

(a) Techniques d'enseignement

(1) Les techniques suivantes ne sont pas utilisées: enseignement individualisé, jeux, simulations, travail de laboratoire, exposés d'étudiants,

exercices de traduction, excursions et rencontres et présentations théâtrales.

(ii) On accorde d'autre part beaucoup d'importance aux techniques suivantes, classées en ordre d'importance décroissante: cours magistral, maïeutique, travail individuel et tests.

Un répondant accorde une grande importance à la correction en classe d'exercices faits à la maison.

(b) Pourcentage de temps accordé au cours en dehors des heures de classe

En général, les étudiants passent peu de temps à leur cours: une demi-heure dans deux cas.

(c) Matériel pédagogique

(i) Le matériel suivant n'est pas utilisé: manuel de base, manuel de base et manuel(s) secondaire(s) et matériel de laboratoire.

(ii) Le matériel suivant est beaucoup plus utilisé: (les éléments sont classés par ordre d'importance décroissante): sources secondaires, deux manuels de base ou plus de deux, ou des extraits d'autres manuels et ensembles d'enseignement individualisé.

Un répondant précise que l'ensemble d'enseignement indivualisé correspond à un matériel qu'il a préparé lui-même. Sous la rubrique "autre matériel" on trouve une série de textes et d'exercices distribués par le professeur.

4. Evaluation du travail des étudiants

(a) Examen final

Il n'y a aucune dispense de l'examen final.

(b) Composantes de la note finale

(i) Les composantes suivantes n'entrent pas dans le calcul de la note final: autres tests oraux, travaux écrits de groupe ou d'équipe, projets individuels, cahiers, exposés individuels et présentations théâtrales.

(ii) En revanche, les composantes suivantes retiennent l'attention des répondants. Classement par ordre d'importance décroissante: examens de fin d'année, autres tests écrits, travaux écrits individuels, exercices et participation en classe.

On remarquera ici l'importance accordée aux épreuves de contrôle des connaissances qui tiennent compte de l'individualité des étudiants.

FRANCAIS: LES UNIVERSITES

A. L'échantillon

Nous estimons que la situation particulière des institutions de langue française aurait dû inspirer des techniques spéciales d'échantillonage. Le problème est d'importance puisque nous opérons sur des effectifs très faibles (six cours de français). On sait que des effectifs faibles produisent des données peu significatives sur le plan statistique. De plus, l'enseignement en langue anglaise dans cette province découle d'une longue tradition et d'une quantité appréciable d'améliorations au fil des années. Tel n'est pas le cas des institutions françaises, éparpillées sur un vaste territoire à majorité anglophone et qui sont de création beaucoup plus récente.

B. Facteurs qui ont influencé l'enseignement

1. Antécédents des professeurs

L'échantillon qui a fourni les réponses du questionnaire est composé de gens d'expérience: ils occupent tous des rangs élevés dans la hiérarchie universitaire, i.e. agrégés et titulaires. Il n'y a qu'un chargé de cours. Ils cumulent de longues années d'expérience dans l'enseignement et à l'exception d'un seul, ont déjà enseigné le cours qu'ils décrivent au moins deux fois, allant même jusqu'à 14 années d'expérience dans un cas.

Ces professeurs ont aussi une certaine expérience du système secondaire: au moins quatre y ont déjà enseigné pendant deux ans. Quant à leur diplôme le plus élevé, trois mentionnent la maîtrise, trois le doctorat.

2. Prérequis

Il n'y a pas de prérequis pour les cours de première année, mais nous croyons utile de reproduire ici une réponse:

> "Les étudiants nous viennent de différentes écoles secondaires et, par conséquent, leur formation est également différente. S'ils possèdent une certaine formation littéraire, ils manquent presque toujours de méthode. Leurs connaissances linguistiques sont aussi relativement pauvres. Ainsi, la transition entre la dernière année d'école secondaire et la première année à l'université est brusque sinon difficile."

On remarquer ici le problèm de l'adaptation de l'étudiant à l'enseignement universitaire.

3. Caractéristiques des étudiants

(a) Ecarts entre les étudiants sur le plan individuel

Les réponses sont quasi-unanimes. Tous les répondants estiment que l'écart est réel; deux seulement croient qu'il est acceptable et quatre le jugent important.

L'écart est important surtout dans le domaine connaissances générales et des aptitudes. Certains répondants ont même spécifié:

"connaissances en grammaire, stylistique, littérature et méthodologie."

"aptitudes au raisonnement et à l'analyse; aptitude à conduire et structurer une étude suivie et approfondie."

(b) Les étudiants étaient-ils bien préparés?

Ici, l'unanimité est totale. Tous les répondants estiment que les étudiants n'étaient pas suffisamment préparés à suivre le cours.

Trois répondants estiment les étudiants bien préparés dans le domaine des attitudes et mentionnent la motivation des étudiants qu'ils jugent authentique.

Les étudiants auraient pu être mieux préparés dans tous les domaines connaissances générales, aptitudes et attitudes. Reprenons ici quelques commentaires supplémentaires qui ont été fournis:

"capacité d'expression"

"aptitude à la réflexion critique et construite sur des oeuvres littéraires"

"l'attitude assez générale est malheureusement celle de 'consommateur' de littérature: lecture rapide et superficielle. Les habitudes de la réflexion et de l'étude littéraires - et d'abord la capacité de se mettre dans une relation critique par rapport au produit culturel- ne sont pas bien formées"

4. Autres facteurs

On a jugé que le programme-cadre du Ministère de l'éducation de l'Ontario et le contenu et l'orientation des manuels de base n'avaient pas influencé l'enseignement du cours. On peut donc classer les cinq facteurs qui restent par ordre d'importance décroissante:

(i) votre propre intérèt pour la matière et/ou votre formation
(ii) connaissance du sujet par les étudiants
(iii) directives qui vous ont été données
(iv) rapport entre ce cours et d'autres cours suivis en même temps par les étudiants
(v) renseignements dont vous disposez sur les choix de programmes, de cours, d'orientation d'études que font la plupart des étudiants après avoir réussi à votre cours.

Il nous semble que seuls les deux premiers items (i et ii) devraient retenir notre attention. Nous avons obtenu d'autres réponses à la rubrique "autres facteurs" qu'il faut signaler car elles nous paraissent importantes:

(i) formation générale des étudiants
(ii) compétence linguistique des étudiants
(iii) besoins des étudiants
(iv) difficultés conceptuelles
(v) vitesse d'assimilation de la matière

Il semble donc que d'autres facteurs non-prévus au questionnaire déterminent l'enseignement des cours de première année. Il est à remarquer que tous ces facteurs gravitent autour de l'étudiant et nous éclairent sur le problème de l'adaptation de la matière enseignée au niveau et aux besoin réels des étudiants.

C. Caractéristiques des cours

1. Objectifs généraux

(a) Linguistique

Il ressort de l'analyse des réponses que c'est ici l'objectif le moins important, bien que certains répondants y accordent une importance considérable. Cet état de choses s'explique aisément puisque la linguistique, véritable science-outil dont personne ne songerait à mettre en doute l'utilité, se conçoit d'abord comme une science auxiliaire pour les études françaises. Nous notons d'ailleurs que ceux qui y accordent une attention particulière le font au niveau de l'éveil de la conscience linguistique: c'est donc dire que c'est à l'étude de la langue qu'ils appliquent les principes de la science linguistique.

(b) Langue

Cet objectif vient en deuxième place seulement et les répondants insistent surtout sur la nécessité de savoir écrire. Les autres objectifs (savoir parler, savoir écouter) paraissent moins importants; on insiste donc davantage sur l'expression écrite.

(c) Littérature

Voici l'objectif le plus important. Et plus que l'analyse du fonctionnement des mécanismes linguistiques propres au texte littéraire, plus que l'analyse des arrangements artistiques du texte littéraire, de la formation du goût littéraire on insiste d'abord et avant tout sur l'analyse du contenu culturel du texte littéraire: c'est l'objectif littéraire le plus important chez nos répondants.

On retiendra donc que les cours de première année de l'échantillon sont d'abord des cours de littérature mais dans lesquels on se soucie des aspects particuliers de l'enseignement de la langue; cette approche nous paraît raisonnée dans la mesure où elle répond effectivement aux besoins des étudiants dont on a remarqué les faiblesses au niveau de l'expression. Les répondants accordent aussi une importance considérable aux objectifs suivants, non-prévus au questionnaire:

"compréhension d'une période littéraire"
"développement du 'dire' artistique en relation avec l'évolution d'une société"
"développer une réflexion critique"
"apprendre à travailler"
"organisation de l'expression de la pensée"

2. Objectifs spécifiques et distribution du temps

(a) Contenu du cours

Objectif langue: on l'a déjà vu, cet objectif vient en seconde place chez nos répondants. On ne s'étonnera donc pas qu'en augmentant le nombre des sous-catégories de l'objectif principal, l'on observe quantité d'objectifs spécifiques qui soient non-pertinents. Dans l'ensemble, les travaux écrits et l'étude des éléments fondamentaux de la langue ressortent comme les objectifs spécifiques les plus importants. En général, les répondants estiment que les étudiants leur arrivent avec un niveau qui va de inacceptable à acceptable, qu'à la fin du cours, le niveau atteint est très acceptable ou presque ce dernier semble être celui qu'ils aimeraient trouver chez leurs étudiants au

début du cours (quoique nous ayons noté des écarts importants); à la fin du cours, le niveau atteint dépasserait le niveau supérieur. Quelle signification pouvons-nous attribuer à ces réponses sinon qu'elles reprennent ce qu'on sait déjà (faiblesses et besoins des étudiants, objectifs des cours) en y ajoutant les desiderata des enseignants? Du reste, ces souhaits n'ont rien de révélateur: il est sûr que si les étudiants arrivaient à l'université mieux préparés, ils seraient plus en mesure de profiter des enseignements qui leur sont proposés. Voilà ce que nous décelons à travers les réponses obtenues. Signalons enfin que nos effectifs étant si faibles, aucune constante statistique ne peut être établie.

Objectif linguistique: la plupart des répondants ont laissé les cases vides ou indiqué la non-pertinence des objectifs spécifiques linguistiques. Cela nous paraît normal vu l'importance relativement faible accordée à cette discipline dans les cours de première année.

Objectif littérature: de nouveau, même tendance que pour l'objectif langue. D'un niveau faible, les étudiants accèdent normalement à un niveau plus élevé en fin de cours; cette proportion serait légèrement gonflée si l'on tenait compte des desiderata des répondants, atteignant le niveau supérieur dans la plupart des objectifs.

Objectif culture: en général, les répondants estiment que l'objectif culture est non-pertinent dans leur cours. On sera peut-être déçu que cette partie du questionnaire n'ait pu apporter plus de renseignements. Il se dégage une tendance générale que nous avons soulignée plus tôt: les répondants estiment leurs étudiants mal préparés et feraient un bien meilleur travail dans de meilleures circonstances. Une phrase d'un répondant résume bien cette tendance:

> "Le cours se proposait d'améliorer la langue écrite dans le but ultime d'arriver à une phrase correcte, imagée, efficace, à transmettre une pensée ou à décrire le réel. Le cours s'est réduit à corriger les fautes de grammaire, d'orthographe etc.."

Faut-il en conclure pour autant à une dégradation de l'enseignement universitaire? Les données de cette enquête ne nous le permettent pas mais il ne serait pas mauvais qu'on se penche éventuellement sur cette question qui se pose de plus en plus. Dans quelle mesure l'adaptation de l'enseignement universitaire aux besoins des étudiants équivaut-elle à une "dégradation"?

(b) Distribution du temps

La complexité de cette partie du questionnaire n'est pas justifiée car il y a, en effet, dans l'étude du français une telle coïncidence des objectifs que leur isolement en 35 unités de temps peut paraître inutile. Certains répondants ne respectent pas les consignes et regroupent les objectifs; d'autres ne cachent pas l'imprécision de leur réponse: "...en tout cas, ce que j'ai mis dans cette section ne sont que des approximations."

Il est possible toutefois de noter une certaine coïncidence entre les objectifs généraux du cours et la proportion de temps accordée à chaque objectif. On va donc insister d'abord sur la littérature, ensuite sur la langue et enfin, sur la linguistique qui n'entre que très faiblement en considération.

3. Techniques et méthodes d'enseignement

(a) Techniques d'enseignement

(i) Les techniques suivantes ne sont pas utilisées: jeux, simulations, travail de laboratoire, dictées (tests exclus), exercices de traduction et présentations théâtrales.

(ii) Les techniques suivantes sont peu utilisées: travail en petits groupes, séminaires, exposés d'étudiants, tests, recherches à la bibliothèque, techniques audio-visuelles et excursion et rencontres.

(iii) Les techniques suivantes, classées par ordre d'importance décroissante, sont les plus fréquemment utilisées: maïeutique, cours magistral, travail individuel et enseignement individualisé.

Il semble donc qu'il y ait un effort de la part du corps professoral pour pallier les difficultés d'adaptation des étudiants. Aux leçons magistrales s'ajoutent des techniques visant à développer la réflexion critique. On note aussi une nette tendance à l'enseignement individualisé auquel s'ajoutent des travaux individuels sous la direction du professeur. Certains répondants utilisent des méthodes non-prévues au questionnaire mais qui s'inscrivent dans cette tendance, comme par exemple, des travaux pratiques en classe conçus à partir de corrigés de devoirs; un répondant inscrit la participation active des étudiants à la rédaction de l'hebdomadaire local.

(b) Pourcentage de temps accordé au cours en dehors des heures de classe

On peut retenir qu'en moyenne, les étudiants consacrent environ une heure et demie au cours, en dehors des heures de classe.

(c) Enseignement modulaire

Un seul professeur utilise des modules d'enseignement; il semble qu'au niveau de l'échantillon, cette technique d'enseignement ne soit presque pas utilisée.

(d) Matériel pédagogique

(i) Les matériaux suivants ne sont pas utilisés: manuel de base, manuel de base et manuel(s) supplémentaire(s), deux manuels de base ou plus de deux ou des extraits d'autres manuels et manuel de laboratoire.

(ii) Les matériaux suivants sont peu utilisés: publications et revues savantes, ensembles d'enseignement individualisé, autre matériel (journaux, revues, brochures) et matériel audio-visuel.

Les répondants ont indiqué qu'ils se servaient de sources secondaires (item prévu au questionnaire) de façon raisonnable, mais c'est à la rubrique "autre matériel" qu'ils énumèrent les matériaux utilisés le plus fréquemment: oeuvres littéraires, textes, notes de cours préparées par le professeur et dossier construit à partir de textes journalistiques.

Nous touchons ici à un des nombreux problèmes posés par l'utilisation d'un questionnaire d'inspiration anglaise. L'importance accordée à l'utilisation d'un manuel de base nous semble démesurée et ne reflète pas la réalité d'une approche française, plus critique, où l'on accorde plus d'importance à l'oeuvre en soi et pour soi, aux textes eux-mêmes qu'à l'analyse de ces textes qui ne serait d'ailleurs que le reflet d'une seule pensée, figée dans un quelconque "manuel".

Aucun manuel n'est utilisé pour les cours de première année.

4. Evaluation du travail des étudiants

(a) Examen final

Aucune dispense de l'examen final n'existe. Par ailleurs, il y a pas d'examen dans trois cas.

(b) Composantes de la note finale

(i) Les composantes suivantes n'entrent pas en jeu: examens semestriels, travaux écrits de groupe ou d'équipe, cahiers, présence, exposés individuels et présentations théâtrales en groupe.

(ii) Les composantes suivantes n'entrent que faiblement en jeu: autres tests écrits, participation en classe/laboratoire, projets individuels, projets de groupe ou d'équipe, exercices, efforts et autres tests oraux.

De loin le plus important, c'est le poids accordé aux travaux écrits individuels qui retient l'attention des professeurs. De plus, ceux-ci associent à cet effort individuel l'épreuve d'un examen final formel dont l'importance est toutefois moindre. On retient donc que le professorat accorde à l'évaluation des efforts individuels une importance considérable mais que l'épreuve d'un contrôle formel des connaissances garde sa place à l'université.

LA TRANSITION SECONDAIRE/POST-SECONDAIRE

12e année-collèges communautaires

Dans le domaine de l'enseignement du français, la perception d'un problème de transition entre la 12e année et les collèges est assez difficile à définir. Cela tient au caractère fondamentalement pratique des enseignements qu'on y dispense. Puisque les cours s'ajustent aux besoins des étudiants et que ces besoins sont définis par un test de compétence linguistique, on peut difficilement parler de transition. Il s'agirait plutôt d'une adaptation qui annule, de fait, tout problème de transition. Nous croyons, somme toute, que la question est prématurée surtout si l'on tient compte du fait que le Collège Algonquin attire à lui seul plus de 70% de la clientèle francophone de la province. Les répondants ont estimé que la préparation des étudiants était très faible. Cette insatisfaction mériterait, à elle seule, une enquête détaillée qui aboutirait sans doute à la définition d'un seuil à partir duquel on pourrait envisager un enseignement efficace du français. Nous croyons que cette enquête devrait être confiée à ceux qui ont à oeuvrer quotidiennement avec les étudiants et qui ont une connaissance pratique de leurs besoins. Nous songeons plus particulièrement à un groupe de professeurs de français des deux niveaux concernés.

Dans les collèges communautaires on a très vite compris la nécessité d'adapter l'enseignement du français aux besoins spécifiques d'étudiants francophones se destinant au marché du travail dans une province à majorité anglophone. C'est ainsi qu'on a transformé un cours d'auteurs et d'ethno-littérature en un cours de réflexion sur la correction linguistique. Du côté pédagogique, l'accent s'est déplacé du professeur vers l'étudiant: on insiste davantage sur ce que l'étudiant apprend que sur la matière en soi. Les cours magistraux ont disparu et sont remplacés par des enseignements beaucoup plus individualisés. Cette approche très pratique de l'enseignement de la langue nous paraît justifiée et on ne peut que déplorer qu'elle ne soit pas plus répandue.

13e année-université

Si l'on tient compte des données de cette enquête, nous décelons sans trop de peine un problème de transition assez sérieux. Les professeurs d'université reconnaissent presque unanimement la faiblesse de préparation de leurs étudiants et ce, au niveau de l'expression aussi bien que de la capacité à entreprendre des études littéraires.

Si l'on examine les réponses des répondants de la 13e année (groupe 5) on remarque aussi une certaine inquiétude, dans les mêmes domaines. Selon nous, s'il y a problème, c'est dans les années terminales du système secondaire qu'il faut le chercher. Si l'on tient compte des commentaires des répondants, on voit qu'ils s'estiment assez satisfaits de la préparation de leurs étudiants mais peu contents des résultats obtenus. Cette tendance est beaucoup plus marquée en 13e année. Au fond, les répondants semblent distinguer entre "préparation pour suivre leurs cours" ce dont ils disent être assez contents et "capacité de maîtriser les objectifs du cours" où ils sont déçus. Il y a aussi un certain malaise à l'endroit du Programme-cadre du Ministère: il semblerait que les répondants, dans une certaine mesure, se croient limités à l'intérieur du système actuel; dans certains cas, ils estiment pouvoir arriver à de meilleurs résultats en dehors de ces contraintes administratives.

Au niveau universitaire, les directeurs de département sont conscients à la fois de la qualité de l'enseignement et du besoin d'adaptation des programmes aux besoins des étudiants. Les cours de première année qui font l'objet de cette enquête sont effectivement le résultat d'un long cheminement de réflexion et de remaniements. Les techniques d'enseignement ont progressivement évolué, depuis le traditionnel cours magistral jusqu'aux techniques plus souples qui respectent l'individualisme des étudiants. On note - et on encourage - une participation plus active de l'étudiant en classe: cela va même jusqu'à une certaine co-gestion du cours où se conjugent les efforts du professeur et ceux de l'étudiant. Les dispositions budgétaires ont permis la formation de petits groupes qui favorisent ce type d'enseignement.

Les techniques d'évaluation ont aussi évolué. De l'épreuve unique de l'examen final, on se dirige de plus en plus vers des méthodes plus équilibrées où l'on tient compte des travaux individuels réalisés en cours d'année.

Ce qui retient toutefois l'attention dans cette enquête c'est le manque de préparation de l'étudiant. A ce propos, on déplore le fait que les étudiants ne lisent plus, qu'ils s'expriment difficilement par écrit, même si leur réceptivité s'est améliorée au fil des années. De l'avis des chefs de département, les écoles secondaires ne sauraient être tenues les seules responsables de cet état de choses: le problème est beaucoup plus vaste et rejoint les fondements mêmes de la société dans laquelle nous vivons. Les étudiants d'aujourd'hui ont une maturité psychique différente de celle de jadis et doivent affronter des problèmes nouveaux émanant de la civilisation actuelle. Il va sans dire que l'étudiant franco-ontarien n'échappe pas à ces considérations dont la gravité est amplifiée par sa situation linguistique.

Les départements d'études françaises de cette province déploient, croyons-nous, des efforts louables pour assurer à l'étudiant francophone une maîtrise telle de la langue qu'il puisse accéder à un niveau avancé d'études. Ainsi voyons-nous des ateliers de correction linguistique à l'intention de ceux dont un test a déterminé des lacunes sérieuses au niveau de l'expression écrite. On essaie aussi de résoudre ce problème avec la préparation d'un test qui vise à identifier les besoins spécifiques des étudiants en début d'études en vue de la création d'unités de récupérage. Les retombées de ces recherches sur le niveau secondaire sont importantes puisque la correction linguistique pourrait éventuellement se faire avant l'entrée à l'université, ce qui serait hautement souhaitable.

9 Trends

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TRENDS

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TRENDS

In the preceding sections we have presented information on the current status of selected courses offered in the senior years of secondary school and the first year of colleges and universities. Some of the historical events that have led to this situation have also been noted. In this chapter the emphasis will be placed on trends, particularly with regard to student achievement and course and program enrolment. Critics have strongly suggested that students are now obtaining higher marks and at the same time are tending to avoid more difficult courses. We explore the factual information relating to these issues and also present perceptual information based on interviews with department heads, course supervisors, and registrars and comments from questionnaires. We have tried, whenever possible, to trace back over a period of ten years. This enables us to consider the implications of the period before the Reorganized Program (although introduced in 1962, the Reorganized Program did not influence the senior years until three or four years later), the period of the Reorganized Program (1965 to 1971) and the credit system (after 1971). This time frame also allows us to estimate the effects of the removal of the grade 13 Department of Education examinations on both student achievement and course enrolments. During this period educational decision-making was decentralized; Department of Education course outlines became guidelines; and County Boards of Education were established. In this chapter we also consider trends in the assignment of advanced standing for students, remedial programs, and admission and selection procedures at post-secondary institutions.

Enrolments

SECONDARY SCHOOLS

Enrolments grew markedly in Ontario secondary schools, from 1963 to 1974 (364,210 to 589,650) but a downswing has now begun. Projections indicate that unused classrooms and schools and a need for fewer teachers will be the pattern for the next ten years.

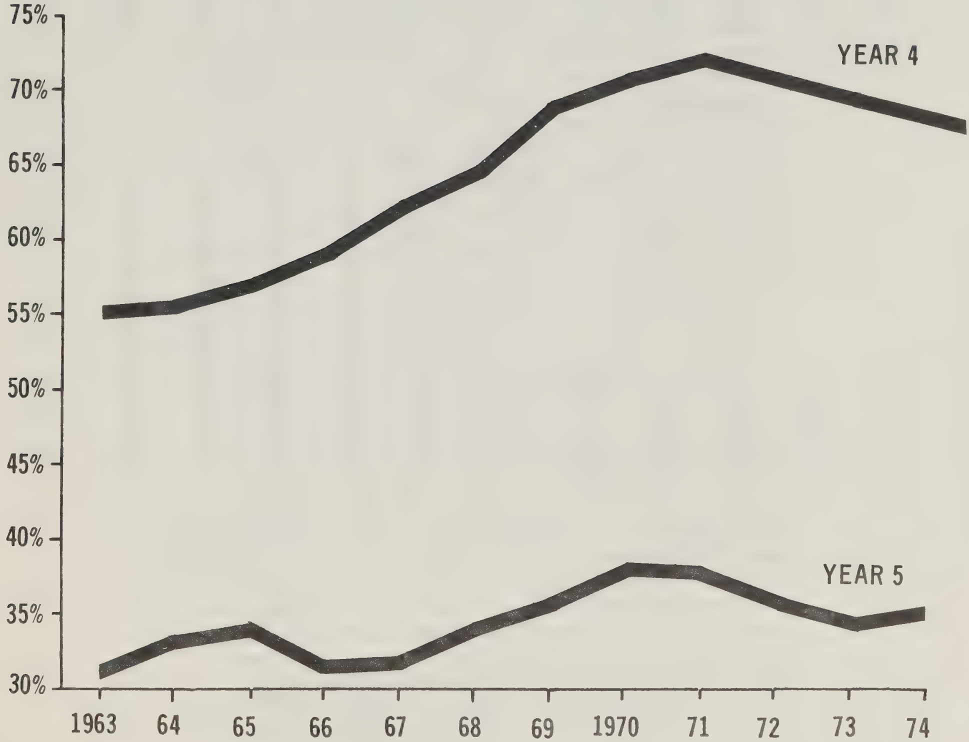
The argument is often made that the quality of secondary education is lower now because we are educating many more young people than we were ten years ago. In raw numbers, of course, this is true but there has been little change in the proportion of students continuing to year 5. Interestingly, in the past three or four years there has been a decline in the holding power of secondary schools at the year 4 level and to a lesser extent year 5. Perhaps surprisingly, this decline parallels the expansion of the credit system (see figure 21).

(a) Year Four Course Enrolments

Course enrolments were closely tied to the program in which students were enrolled up to 1971; only when the credit system was widely adopted were students given substantial freedom in selecting their courses. Ministry of Education data are normally combined for years 1 and 2 and years 3 and 4, and this tends to obscure subtle changes in year 4 course enrolment. The English, French, history and mathematics enrolment information are combined for years 3 and 4 in Figure 22. The percentages are based on the total number of students enrolled in years 3 and 4. A figure of 75.7 percent for mathematics in 1971 means that 75.7 percent of all students enrolled in year 3 and 4 are taking mathematics. Senior physics is normally offered only in year 3 and therefore, the figure in the table more closely represents the variation in a single year's enrolment; physics enrolments appear small in comparison to English and mathematics because they represent only one year's enrolment of students while the others represent two. To obtain comparable figures it would be necessary to combine physics enrolments (year 3) with chemistry enrolments (year 4) plus enrolments in other science courses offered in these two years to obtain a picture for "Science".

Figure 21

PERCENTAGE OF STUDENTS ENROLLED IN YEAR 4 AND YEAR 5 FROM 1963 to 1974, USING AS A BASE 100 PERCENT ENROLLED IN YEAR 1



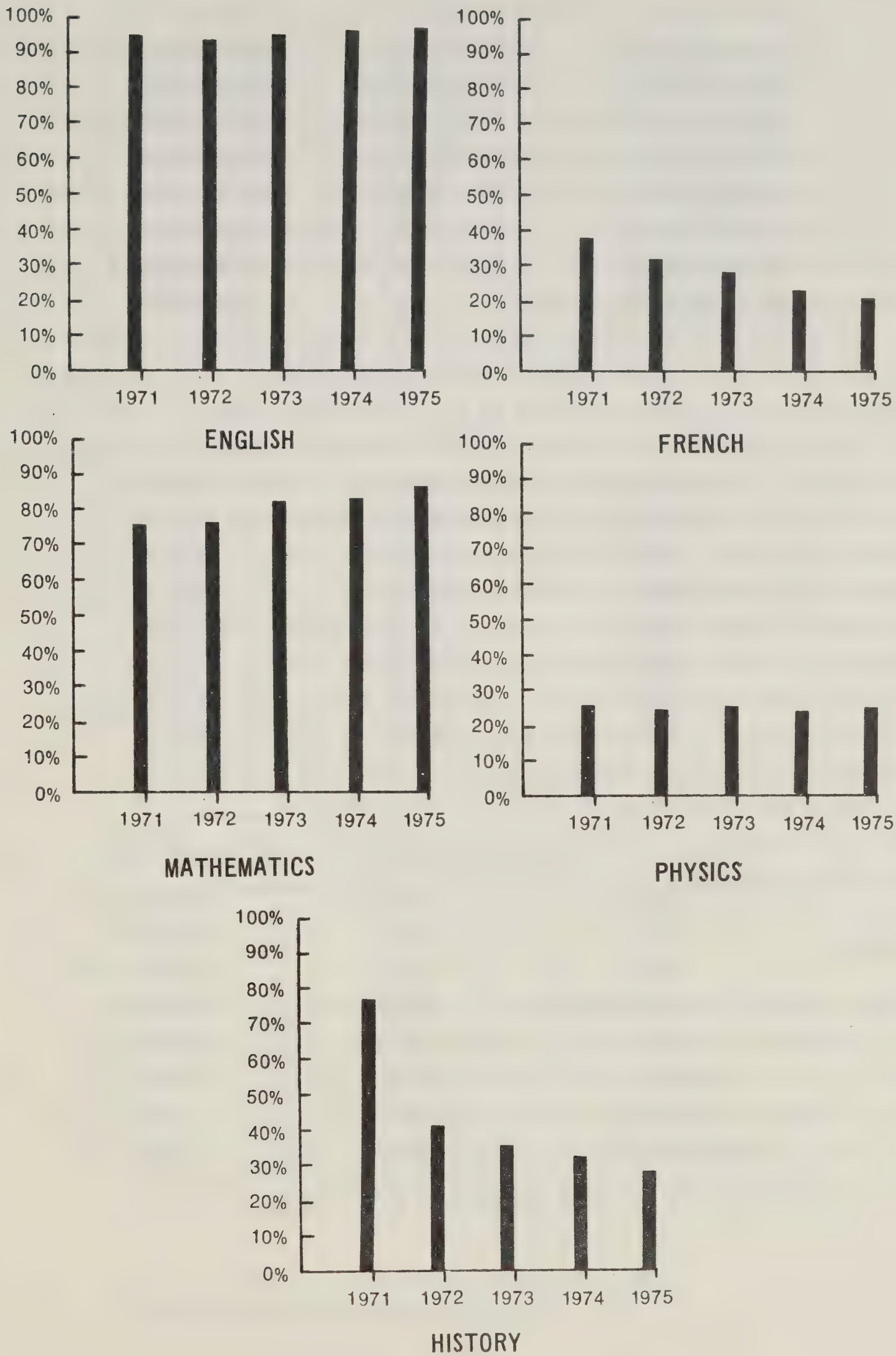
The data on enrolments presented in Figure 21 comes from Ministry of Education records. (Education Statistics, Ontario 1974 p. 17 and Report of the Minister of Education 1971 p. 63.) They are summarized from a form filled in by the principal of each secondary school at the end of September in each school year.

It is clear from Figure 22 that virtually every student continues to take English in years 3 and 4, that mathematics enrolments have increased and physics has remained quite stable. Enrolments in both history and French have dropped substantially. This phenomenon is discussed in some detail in a previous report.

> At the present time in Ontario, students appear to be selecting courses in terms of two main criteria. The first criterion relates to career aspirations and might be stated, "What courses do I need to get me to the next stage of education or the job I seek?" Some students attempt to keep as many doors open as possible and may select as many as six "core" courses for this purpose. Other students will select as few as three. Although the number of "core" courses varies from student to student, it will usually include English and mathematics for virtually all students from years I to IV and science for most students. The second criterion relates to interest; courses selected by a majority of students for non-career purposes fit this category. However, history, geography, French, data-processing, and the like might be selected by some for a career purpose and by others for interest's sake. With different students seeing the same courses in different ways, the overall effect is that courses can vary considerably in enrolment depending on a number of in-school factors as well as fluctuations in the labour market. For example, "high-risk" courses in which there may be a high failure rate and a heavy workload will probably suffer declining enrolments because students see very little point in taking chances with courses that are not critical in terms of their career aspirations. Interest courses that are "low-risk" and deal with relevant issues such as law, consumer education, theatre arts, and man in society will probably maintain fairly stable enrolments.
> The current decline in French enrolments is quite predictable in terms of the criteria noted above. French is not required for admission to most university programs and as a result must compete as an interest subject but its image as a "high-risk" subject can have the effect of intimidating all but the most interested students. Unless this image of French changes, the decline will continue and the vast majority of students will avoid it. (King et al, 1975, p.2)

Figure 22

YEAR 3 & 4 COURSE ENROLMENT AS PERCENTAGE OF SENIOR DIVISION ENROLMENTS



(b) Year Five Enrolments

Figure 23 presents year 5 enrolments from 1967/8 to 1974/5. These figures have been developed in a different way from Figure 22 because year 5 students are far more likely to take more than one course from a subject area (e.g., two English, three mathematics). The percentages given for each subject are determined on the basis of the total number of year 5 credits taken by students in each subject area as a percentage of all year 5 credits taken. It also must be remembered that the total number of courses required for the SSHGD and entrance to university was reduced to six during this period.

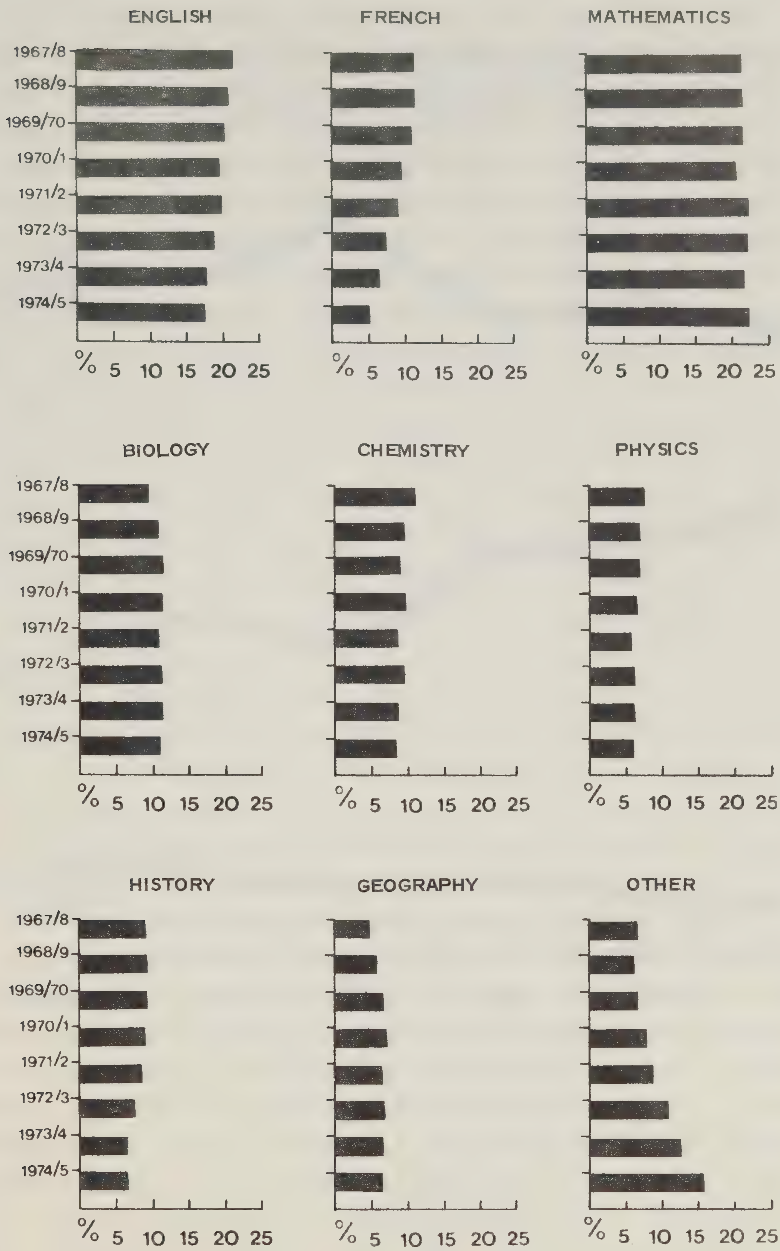
Although the vast majority of students continue to take English there is still a noticeable trend that indicates more and more students are leaving year 5 without English as one of the SSHGD subjects. Of late there as been a sharp reversal at most Ontario universities regarding the role of year 5 English; the subject is now required by most universities for entry into most programs. We expect that all year 5 students will again take English as part of their SSHGD. Science and mathematics enrolments have remained quite stable in the 1970s. The post-secondary requirements for many courses have encouraged many students, and particularly boys, to retain these subjects. History enrolments have declined slightly, but the enrolment decline in French is quite pronounced and very few boys are taking French by year 5. Enrolments in Home Economics--the Canadian Family in Perspective--(the course with the largest enrolment in the "other" category of Figure 23) continue to grow and this is consistent with the analysis of factors influencing course enrolments discussed previously.

COLLEGES

College enrolments were investigated in terms of program areas (e.g., Arts and Recreation, Technology), and of program length (students may take 1-, 2- or 3-year programs in most areas). Although there are optional courses available to college students as part of their total program, for the most part students are required to take the courses selected in this study as basic components of programs.

Figure 23

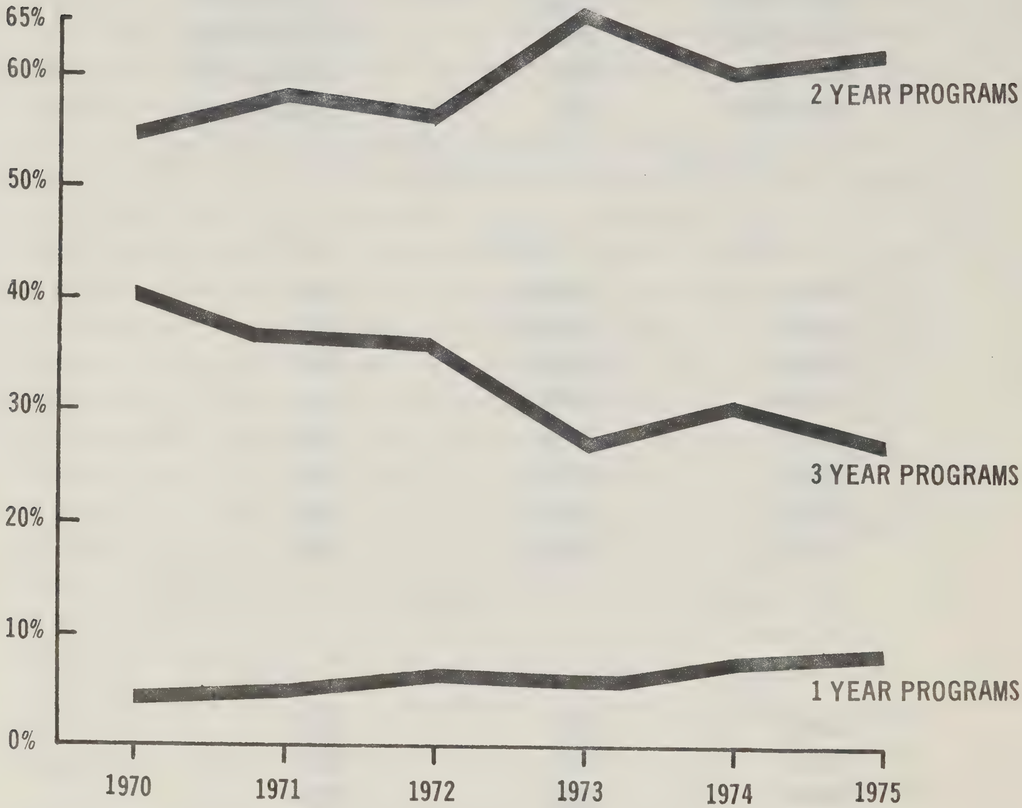
ENROLMENTS IN YEAR 5 COURSES AS A PERCENTAGE OF TOTAL YEAR 5 CREDITS, 1967-1975



Because of the small size of the sample, Year 5 Français has been reserved for discussion in the text.

Figure 24

COLLEGE ENROLMENTS IN 1, 2 and 3 YEAR PROGRAMS AS A PERCENTAGE OF TOTAL ENROLMENTS



For this reason it is far more useful to consider patterns of program enrolment rather than enrolments in particular courses.

Enrolments of students entering the first year post-secondary programs at the colleges of applied arts and technology have increased from 17,786 students in 1970 to over 32,000 students in 1975 - an 82 percent increase over the six-year period.

The enrolment trends have been somewhat distorted upwards due to the integration of nursing education into the college system in 1973. Nursing students who entered in 1973 in the second year of their program were considered to be in the first year at the college, and received advanced standing relating to their work at nursing schools; percentages for 1973 in Figure 25 reflect this. By 1974 only first year students were included in computation of the total first year enrolment.

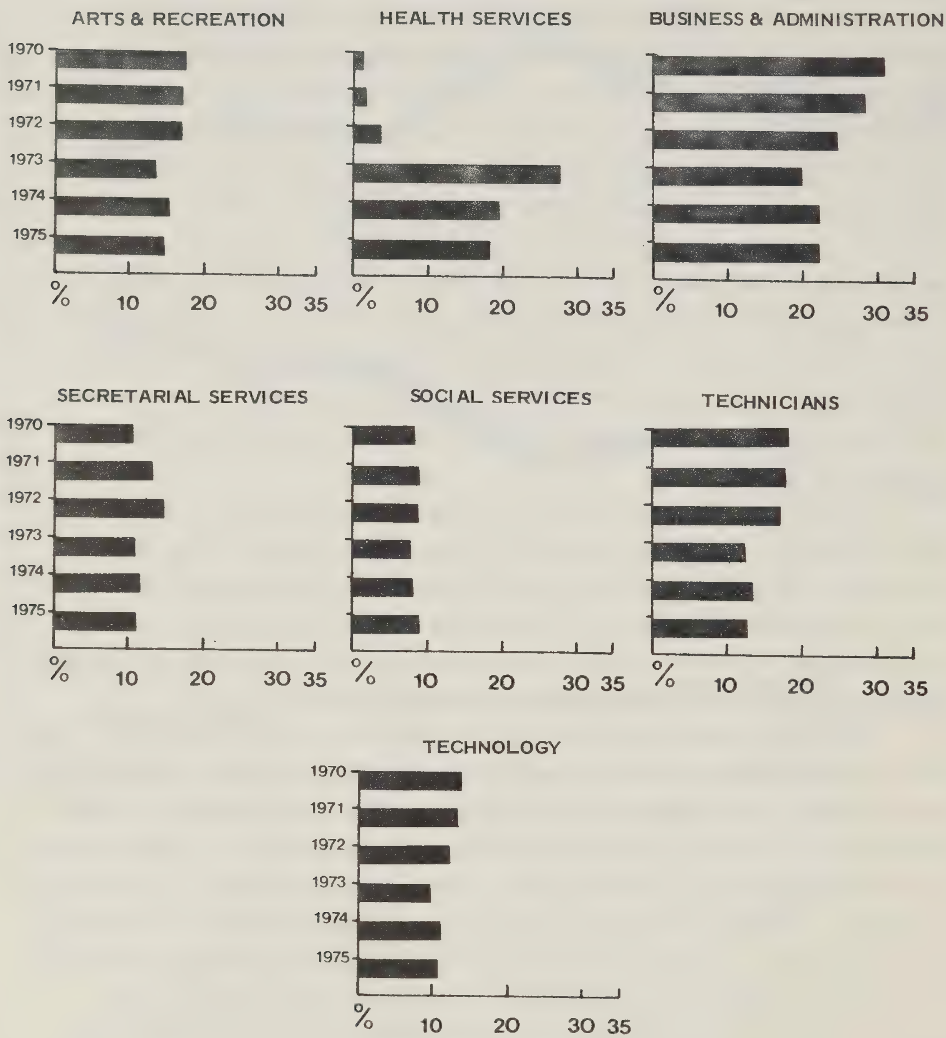
It is best to consider these trends in their historical context. The colleges, when opened in 1967 and 1968, generally offered programs in Business and Technology. But in the early 1970s the number of programs in other areas, e.g., applied arts programs, began to proliferate. As previously noted, this expansion of programs continued in 1973 when nursing and other health sciences programs were introduced into the colleges.

In the last two years, very few new programs have been introduced. This is directly related to budgetary constraints, forced by government ceilings on educational grants, which have forced colleges to take a hard look at programs. Programs with continued low enrolments and/or bleak job prospects for graduates are being considered for phase-out or consolidation with other programs.

Enrolment growth has taken place mainly in two-year programs. Once again, this has been caused in part by the influx of nursing students, but there also has been a trend in the last two years to consolidate 3-year programs into 2-year programs by extending the length of the student year. On a percentage basis, over six years, the greatest increase (272 percent) has been in students entering 1-year programs (see Figure 24). This percentage increase is less significant as the number of students involved is comparatively small (1,960 in 1975). In the last three years, post-diploma programs of one or two semesters' duration, e.g., Critical Care Nursing, Neo-natal Nursing have been added. This type of program may grow

Figure 25

ENROLMENTS IN COLLEGES OF APPLIED ARTS & TECHNOLOGY PROGRAM AREAS, AS A PERCENTAGE OF TOTAL FIRST YEAR COLLEGE ENROLMENT



significantly in the future as colleges seek to cope with the continuing education of their graduates.

The percentage increase from 1970 to 1976 has been the least dramatic in the number of students entering the first year of 3-year programs. In six years, first year enrolment in these programs has increased only 33 percent and by less than 3,000 students overall.

Figure 25 and Table 9.1 show first year enrolments in program areas from 1970 to 1975 inclusive. On the figure, enrolments are presented as a proportion of the total first year enrolment in all programs for each year. Table 1 provides the figures for each year. Since colleges offer such a variety of courses, we established broad program categories in order to simplify our analysis. The following classifications were made (examples of some programs included in each classification are given):

(1) Arts and Recreation: communication arts, recreation leader, graphic arts, film production;

(2) Business and Administration: business management, advertising, personnel administration, computer program, accounting, hotel and restaurant administration;

(3) Health Services: nursing assistant, dental hygiene, physiotherapy;

(4) Secretarial Services: clerk stenographer, legal office administration dictatypist, bookkeeping and business machines;

(5) Social Services: early childhood education, home economics, addiction counsellor;

(6) Technicians: all technician programs (usually 2 years in duration);

(7) Technology: all technology programs (usually 3 years in duration).

Growth rates in these seven different program areas have varied. Arts and Recreation enrolments increased most from 1970 to 1972. Although growth in these areas has continued, the growth rate appears to have slowed down considerably.

Business and Administration enrolments have increased at a steady rate although proportionately the percentage of students taking these courses declined between 1970 and 1972.

Health Services enrolments were increased greatly when nursing programs were taken over by colleges in 1973, but enrolments have decreased sharply in the past few years, reflecting a shortage of employment

TABLE 9.1

FIRST YEAR COLLEGE ENROLMENTS BY PROGRAM AREA: 1970-1975

Program area	1970	1971	1972	1973	1974	1975
Arts and recreation	3,178	3,692	4,392	4,700	4,746	4,843
Business and administration	5,361	5,622	6,133	6,601	6,996	7,340
Health services	182	195	873	8,773	5,912	5,835
Secretarial services	1,777	2,525	3,318	3,497	3,362	3,386
Social services	1,354	1,967	2,269	2,476	2,632	3,066
Technicians	3,343	3,863	4,400	4,500	4,434	4,454
Technology	2,591	2,919	3,118	3,297	3,558	3,587
Totals	17,786	20,783	24,503	33,844	31,640	32,511

opportunities for graduates and a reduction of available space for nursing students.

Enrolments in the Social Services area have steadily increased since 1970. Secretarial Services enrolments levelled off in 1974 and 1975.

Enrolments in Technician's programs have levelled off in the past three years but Technology programs have grown steadily.

The colleges have experienced remarkable growth in the last decade. They have been encouraged by government funding policies, the postwar baby boom and an internal drive to gain recognition as a post-secondary educational alternative. Government funding policy no longer encourages enrolment growth and the baby boom is over, but the success of graduates has gained for the college recognition as an important post-secondary alternative.

The rate of growth of enrolment at colleges is slowing down. The communities the colleges were created to serve are being served. The colleges will continue to grow as the demand for their services grows, but the rapid rate of enrolment over the last decade is not expected to continue as the relationship between graduating students and related job opportunities stabilizes.

UNIVERSITIES

(a) Program Area Enrolments

The data we obtained for this analysis were obtained from the Ministry of Colleges and Universities and Statistics Canada records, and are summarized in Figure 26 and Table 9.2.

Changes in the way in which program enrolments were classified into program areas and the addition of new degree programs tend to obscure specific trends in enrolments in program areas from 1962/3 to 1975/6. The table provides raw enrolment numbers which have been translated into proportions and yearly enrolments for the Figure. It is clear that enrolments in the health professions (particularly Dentistry and Medicine) have not grown in a pattern consistent with the overall growth of university enrolments. At the other extreme, education and fine arts program enrolments have grown at a greater rate than the average. But there has been relative stability in law, business and commerce programs, and engineering over the

Figure 26

UNIVERSITY PROGRAM AREA ENROLMENTS AS PERCENTAGE OF TOTAL ENROLMENT 1962-1976

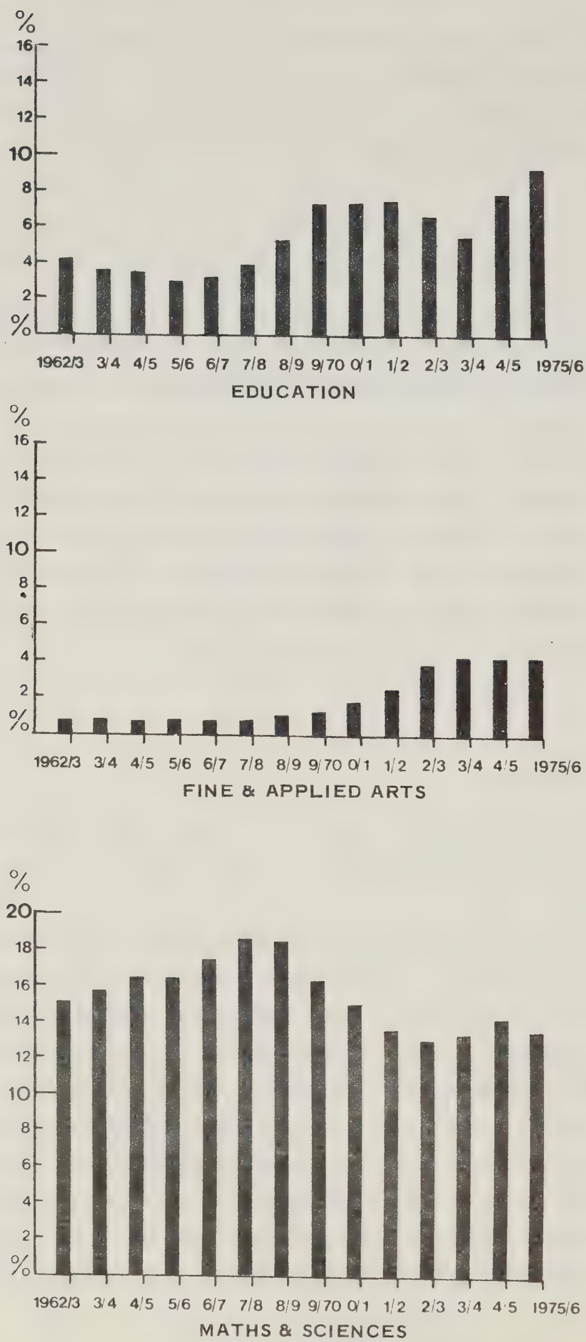
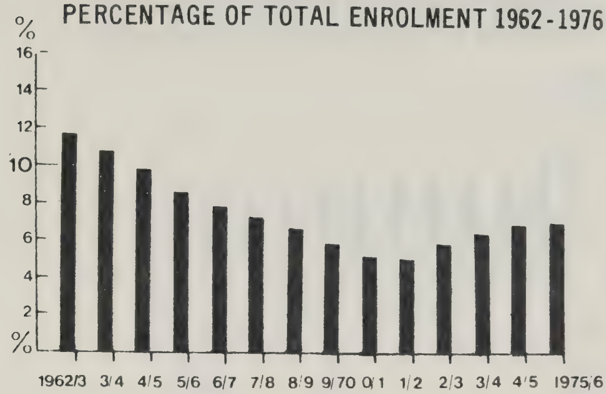
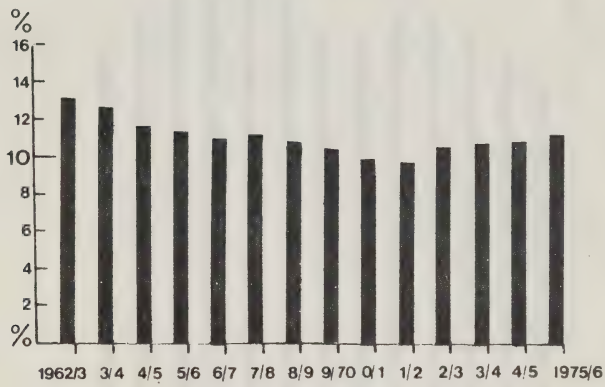


Figure 26 (Cont'd)

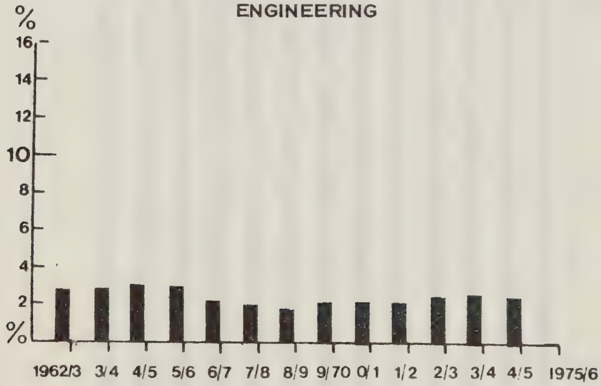
UNIVERSITY PROGRAM AREA ENROLMENTS AS PERCENTAGE OF TOTAL ENROLMENT 1962-1976



HEALTH PROFESSIONS



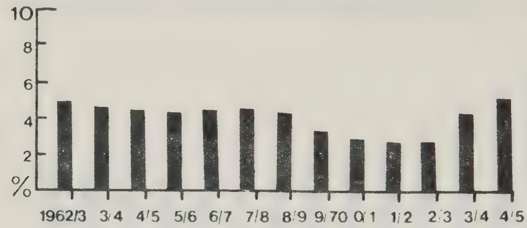
ENGINEERING



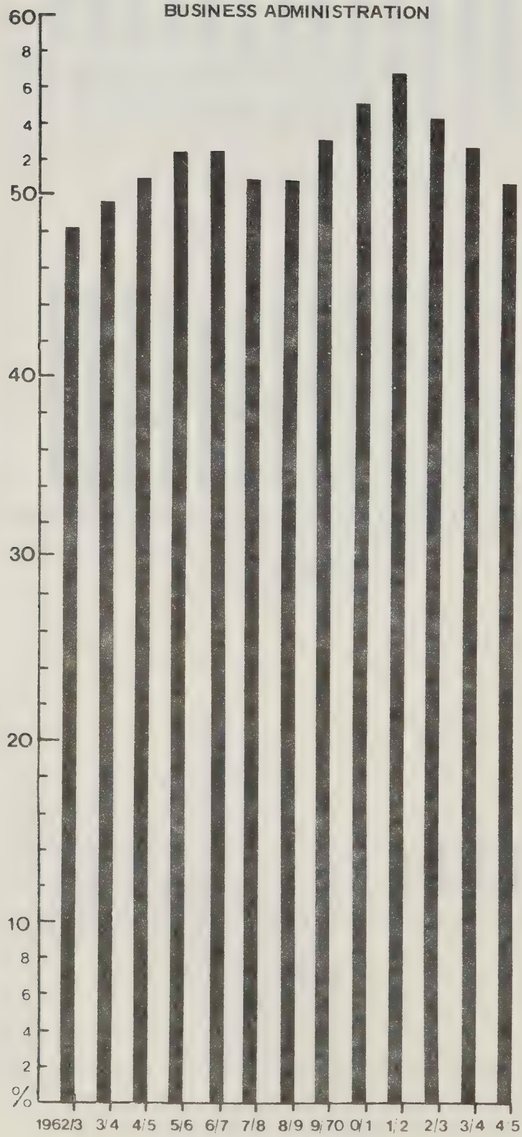
LAW

Figure 26 (Cont'd)

UNIVERSITY PROGRAM AREA ENROLMENT AS PERCENTAGE OF TOTAL ENROLMENT 1962 - 1975



BUSINESS ADMINISTRATION



ARTS & SCIENCES

TABLE 9.2

UNIVERSITY PROGRAM AREA ENROLMENTS
1962/3 to 1975/6

Program Area	62/3	63/4	64/5	65/6	66/7	67/8	68/9	69/70	70/1	71/2	72/3	73/4	74/5	75/6
Education	1,441	1,451	1,608	1,693	2,040	2,631	4,176	6,168	7,184	7,652	7,119	6,221	9,537	11,029
Fine and applied arts	155	190	221	284	341	458	712	1,163	1,733	2,531	4,193	4,732	5,101	5,277
Arts and social sciences	16,958	19,378	22,642	26,842	31,305	34,858	41,082	48,117	56,234	60,877	59,614	60,051	58,614	not available
Math and physical sciences	5,396	6,169	7,254	8,336	10,522	12,582	14,739	14,660	15,260	14,529	14,066	15,316	16,967	17,277
Engineering and applied sciences	4,538	4,861	5,256	5,969	6,877	7,866	8,924	9,524	10,151	9,880	11,726	12,613	13,414	14,433
Health professions	4,069	4,119	4,190	4,271	4,519	4,666	5,073	5,192	5,531	5,791	6,375	7,117	7,828	8,276
Law	1,002	1,181	1,375	1,627	1,714	1,882	2,101	2,414	2,712	2,914	3,166	3,415	3,549	not available
Business administration	1,724	1,861	1,992	2,168	2,591	2,971	3,280	3,261	3,476	3,662	3,758	4,636	5,674	not available
Total	35,283	39,210	44,538	51,190	59,909	67,914	80,087	90,499	102,287	107,836	110,017	114,101	120,684	127,135

years. The proportionate decline in mathematics and science enrolments in the early 1970s appears to parallel reduced job opportunities in these fields (note that the decline was only relative, in raw numbers there was an increase in enrolments). The proportionate decline in enrolments in the Health professions is clearly related to restrictive admission policies in as much as applicants for these programs continue to grow in number.

(b) Course Enrolments

We received first year course enrolment information from nine universities. The formats employed by the universities in recording this information differed somewhat and we have chosen to present data from five universities in separate tables to represent particular points. This approach maintains the anonymity of each institution and still enables us to perform a useful level of analysis. The percentages in the tables for each subject area are based on the total number of first year courses taken in a particular faculty (normally the Faculty of Arts and Science, but there are some exceptions). Some tables include only selected years and some go as far back as 1965.

Sociology and anthropology enrolments peaked in most universities in the early 70s as part of a North American preoccupation with explications of social problems; but they declined sharply by 1973 and are still experiencing slight proportionate declines (Table 9.3, university B illustrates how dramatic a turnabout can be). In most cases economics and business course enrolments have shown a steady increase. English enrolments have declined in spectacular fashion as particular programs and institutions removed the requirement that all students take at least first year English (Universities B and C illustrate this point); they appear to have stabilized over the past three years (University A and B).

History and French enrolments have declined in concert with the enrolment decline in these subjects in the secondary schools. The explanation for it is similar. Interestingly the enrolments in year 1 mathematics and science have remained relatively stable although enrolments in senior years and graduate programs tend to vary in terms of conditions in the labour market.

TABLE 9.3

FIRST YEAR SUBJECT ENROLMENT AS PERCENTAGE OF TOTAL FIRST YEAR ENROLMENT

(a) UNIVERSITY A

Subject	1969/70	1970/1	1971/2	1972/3	1973/4	1974/5
Anthropology/Sociology	10.1	10.1	10.4	8.7	8.1	7.2
Economics	4.3	4.6	5.0	4.3	4.8	6.0
English	11.1	6.7	6.9	6.6	8.1	7.8
French	6.4	6.8	6.7	5.7	5.7	5.6
History	3.6	3.2	2.6	2.5	2.3	2.5
Philosophy	4.3	4.1	2.8	2.2	2.3	2.0
Mathematics	10.0	9.4	11.0	10.4	9.5	9.8
Biology	4.9	4.9	3.0	7.5	7.3	7.3
Chemistry	1.7	5.5	6.4	7.2	6.3	6.6
Geography	2.3	1.9	2.2	1.3	1.4	1.5
Geology	0.7	0.7	0.8	0.6	0.8	1.2
Physics	5.4	5.1	5.9	6.5	5.4	5.4
Psychology	9.3	7.2	6.5	6.4	6.4	6.7
Other	25.9	29.8	29.8	30.1	31.6	30.4

(b) UNIVERSITY B

Subject	1968/9	1969/70	1970/1	1971/2	1972/3	1973/4	1974/5
Anthropology/Sociology	7.2	15.7	17.3	12.4	8.0	6.7	6.3
Economics	4.1	5.1	5.6	6.4	7.0	7.5	8.5
English	13.5	10.5	7.9	7.4	6.7	6.6	6.6
French	8.4	5.4	5.3	5.9	5.9	5.7	5.9
History	4.1	5.1	5.2	3.7	3.7	4.0	3.8
Philosophy	4.6	3.4	3.4	2.6	4.2	3.3	2.5
Mathematics	10.6	9.0	8.4	8.8	9.0	9.0	10.3
Biology	3.8	3.0	3.3	3.9	3.6	3.8	3.6
Chemistry	4.7	4.1	2.7	3.2	3.3	3.1	3.0
Geography	2.1	1.4	1.6	1.8	2.3	1.8	2.1
Geology	3.6	2.6	1.6	2.5	2.2	2.0	1.7
Physics	4.5	4.0	2.4	3.3	3.3	3.5	3.5
Psychology	7.6	9.0	8.0	9.3	9.9	10.8	10.4
Other	21.2	21.7	27.3	28.8	30.9	32.2	31.8

TABLE 9.3 (cont'd)

FIRST YEAR SUBJECT ENROLMENT AS PERCENTAGE OF TOTAL FIRST YEAR ENROLMENT

(c) UNIVERSITY C

Subject	1966/7	1967/8	1968/9	1969/70	1970/1	1971/2	1972/3	1973/4	1974/5	1975/6
Anthropology/ Sociology	8.0	9.8	12.2	12.6	15.1	16.8	19.0	16.3	15.0	14.3
Biology	1.8	2.2	2.1	2.1	4.4	5.8	5.2	5.7	6.1	6.2
Chemistry	5.1	4.7	4.6	4.9	5.0	5.3	5.1	5.1	6.0	6.0
Economics	4.6	4.7	5.8	4.6	5.4	6.0	5.9	6.3	6.5	6.6
English	8.0	7.0	7.0	5.9	6.1	5.6	4.1	3.6	3.5	3.8
French	3.5	3.9	3.3	2.6	2.5	2.9	2.1	1.6	1.6	1.9
Geography	3.7	3.1	4.6	3.1	3.9	3.6	3.1	3.1	2.5	3.4
Geology	2.9	1.2	0.5	0.5	0.5	1.3	1.1	0.9	0.6	0.7
History	6.4	6.8	7.7	5.1	4.9	4.2	3.6	3.2	2.9	2.9
Mathematics	10.4	10.8	10.8	10.5	11.7	11.4	13.2	13.4	15.5	15.2
Philosophy	5.9	7.0	7.6	6.6	4.1	3.4	2.6	2.4	2.0	1.8
Physics	4.8	4.4	4.4	4.4	4.4	4.3	4.3	4.1	5.0	5.0
Psychology	8.7	7.3	8.5	17.0	12.8	8.9	8.9	9.2	10.3	8.3
Other	26.2	27.1	20.8	20.1	19.3	20.8	21.6	25.1	22.5	23.8

(d) UNIVERSITY D

Subject	1970/1	1971/2	1972/3	1973/4	1974/5
Anthropology/ Sociology	1.7	1.4	0.8	0.4	0.4
Biology	3.7	3.4	3.0	2.5	2.5
Chemistry	3.3	3.4	2.9	1.8	1.9
Economics	5.1	4.1	3.7	3.4	3.2
English	4.0	3.0	7.3	6.2	7.2
French	2.9	2.1	2.8	2.3	1.5
Geography	2.2	2.1	3.3	3.3	3.5
Geology	1.8	1.8	1.2	0.9	0.8
History	2.1	1.5	0.3	0.9	1.3
Mathematics	7.3	6.8	8.2	6.3	7.8
Philosophy	3.0	2.7	2.0	3.4	2.6
Psychology	7.8	6.1	9.8	9.4	9.5
Physics	3.2	2.8	2.2	1.4	1.3
Other	51.9	58.8	52.5	57.8	56.4

(e) UNIVERSITY E

Subject	1965/6	1968/9	1971/2	1974/5	1975/6
Anthropology/ Sociology	4.8	6.9	7.4	4.8	4.4
Biology	2.6	2.3	2.7	1.9	1.8
Chemistry	5.0	3.4	6.2	3.6	6.5
Economics	1.5	6.1	6.3	8.1	6.9
English	11.8	3.9	3.7	3.0	2.8
French	4.3	1.5	1.2	1.2	0.8
Geography	1.7	2.9	4.7	2.9	3.0
History	4.4	1.9	2.1	1.6	1.6
Mathematics	25.7	14.9	13.3	14.0	13.5
Philosophy	10.1	4.7	4.4	2.2	2.3
Psychology	9.1	7.6	11.8	6.8	5.8
Physics	8.0	6.1	8.5	5.4	7.9
Other	11.0	37.8	27.7	44.5	42.7

Overall, university course and program enrolments follow fairly predictable patterns. The traditional humanities courses (history, philosophy, classical languages) suffer with the introduction of new courses (environmental studies, sociology) and then work their way back to stability. Enrolments in small professionally oriented programs (physical education, architecture, music, and even theology) grow when job opportunities decline for graduates of general arts programs. Business and economics courses have increased steadily in enrolments but mathematics and science enrolments remain relatively stable.

Not surprisingly there is evidence of strain among instructors administrators and institutions. Extremely specialized human resources can move from first year to graduate courses but not across disciplines. Some departments become understaffed but cannot be propped up from overstaffed departments. Competition in many forms harms morale and is even felt by students. This pattern is pronounced in some universities and only barely evident in others but recognition of it came through in virtually all university department head and registrar interviews.

Student Achievement

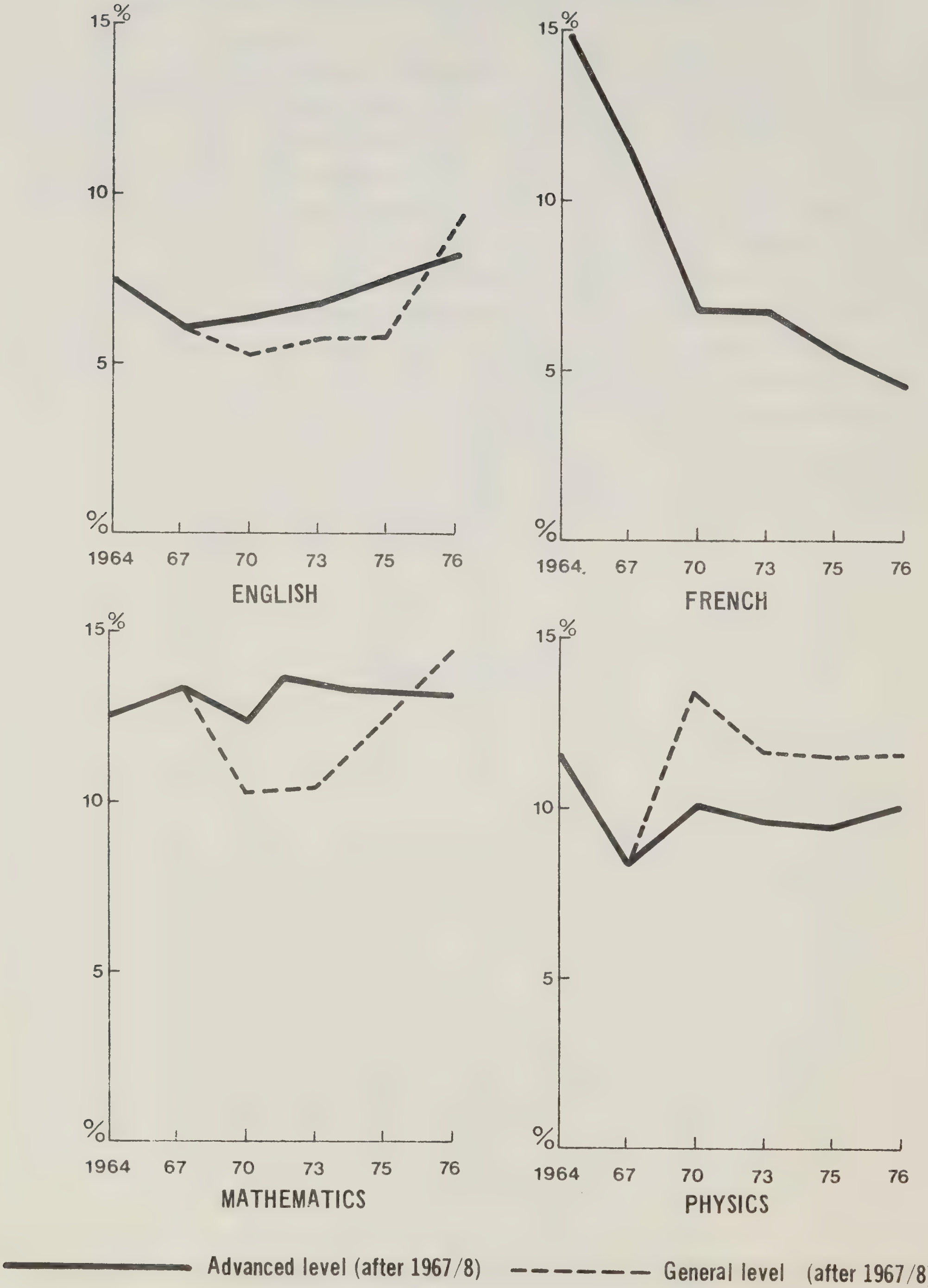
SECONDARY SCHOOLS

(a) Pre Year Five

The data for the analysis of student achievement in years 3 and 4 English, math, physics and French came from two sources. For the years 1964, 1967, and 1970 we used student mark records, submitted to the Ministry of Education from all secondary schools. These reports provided marks information for years three and four. For the years 1973, 1975 and 1976 we used information stored by the Ministry for schools using the Ministry's "Mark Reporting Services". Data for 1973, 1975 and 1976 were available from 56 schools (not necessarily the schools sampled for this report) and the same schools were traced back to 1964. Thirty-seven of these

Figure 27

PERCENTAGE OF YEAR 4 STUDENTS RECEIVING LESS THAN 50 PER CENT FINAL MARK IN 4 SELECTED SUBJECTS, 1964-1976



schools were in operation in 1964, 43 in 1967 and 45 in 1970. Failure rate information collected for other studies was used to estimate failure rates for the years 1973 and 1975 since failure rate information for these schools was not available for these years. The data from this sample of schools were compared with Ministry data for years 1964, 1967, and 1970 and our previous research (King, 1973) and it was found that the findings were essentially the same. There was support for the contention that these schools adequately represented the public secondary schools of the province.

It is clear from Figure 27 that over the past 12 years failure rates in year 4 English have not changed substantially and if anything have begun to increase. At the same time the proportion of advanced level students obtaining 75 percent or more has increased substantially (Figure 28). Comparing the data for the 1970s with those for the 1960s we find a similar proportion of students failing, more students obtaining more than 66 percent, fewer students obtaining between 50 and 65 percent.

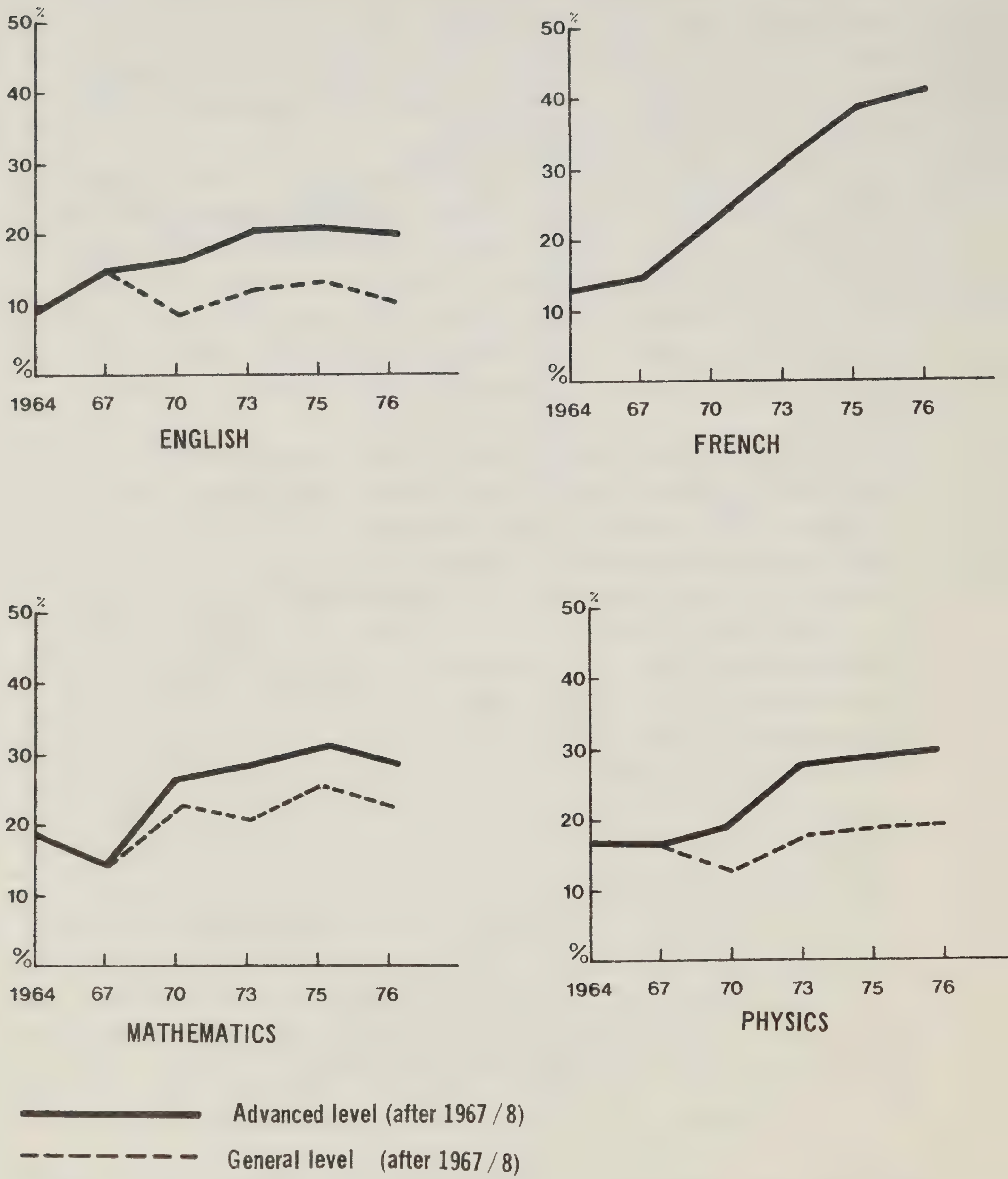
The mathematics pattern is very similar. Approximately the same number of students fail and more advanced level students obtain 75 percent. Year 3 physics follows essentially the same pattern. Physics marks were combined with chemistry in 1964 and 1967; this obscures the overall pattern but the general trend is quite consistent.

The picture in French is quite different. We chose to present only the advanced level French enrolments because year 4 general level French enrolments were extremely small or nonexistent in most of the schools. Failure rates have decreased sharply and the percentage of students receiving 66 percent or more has increased from well under 30 percent in 1964 to over 65 percent in 1976. This pattern tends to be consistent with the contention that only the better language students are taking French.

Using data from the same 56 schools we explored student achievement patterns in secondary school years 1, 2, and 3 for 1975/6. Failure rates were surprisingly high and varied substantially from school to school, much as we noted in our previous research (King, 1973). Failure rates were especially high in general level courses.

Figure 28

PERCENTAGE OF YEAR 4 STUDENTS RECEIVING OVER 75 PER CENT IN SELECTED SUBJECTS, 1964-1976



It is clear that failure rates in years 1 to 4 are at least as high as they were in the 1960s in many schools. Thus it is not surprising to find the holding power of secondary schools decreasing from years 1 to 4 as the effects of the credit system become widespread. We have the ironic situation of more higher and more lower marks being given out simultaneously! Because of a complex, little-understood process, at the same time as some students are obtaining higher marks than they would have in the past, more students are leaving school having failed key courses required for the various post-secondary educational alternatives.

(b) Year Five

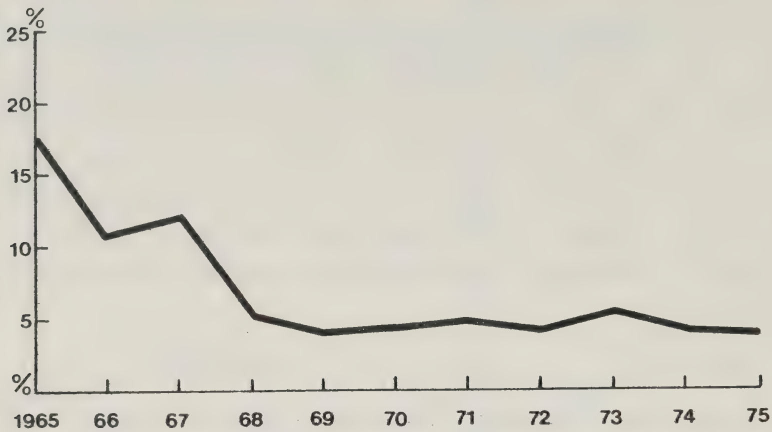
Mark distributions for year 5 courses were recorded in deciles (1-10, 11-20, etc.), from 1970 by the Ministry of Education, and as failures, credits, thirds, seconds, and firsts (0-49, 50-59, 60-65, 66-74, 75+) in the 1960s. Figure 29 presents failure rates in selected subjects from 1965 to 1975 and Figure 30 covers the proportion of students obtaining 80 percent or more from 1970 to 1975. It should be noted that in the latter years of the grade 13 external examination program, the students' marks were scaled when necessary to fit a fairly standard mark distribution pattern. This suggested a stability of student achievement that was not necessarily present.

Figure 29 shows that year 5 English failure rates dropped in concert with the phasing out of the external examination program; the same happened for all other year 5 subjects. From 1968 to the present the failure rates in English have remained about the same (4-5 percent). It can be seen that while the failure rates in English have stabilized, the proportion of students receiving marks over 80 has increased steadily (Figure 30). Over the past six years, however, the average mark assigned has increased only slightly.

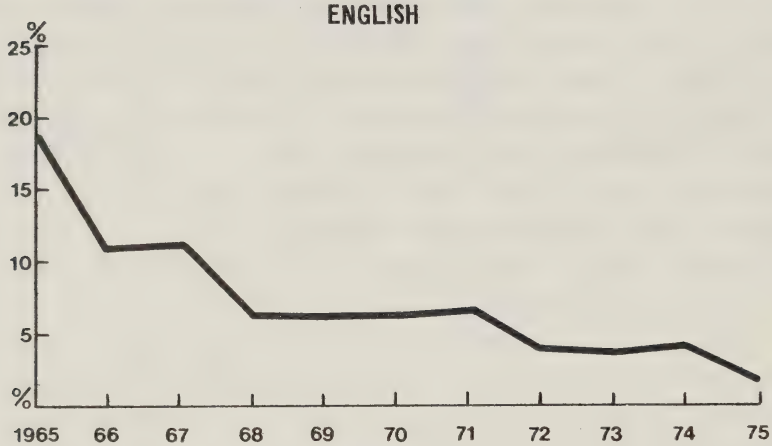
The mathematics marks include all mathematics courses offered in year 5 through the years noted. Therefore such courses as Trigonometry and Geometry in the 1960s are interwoven with the Calculus and Relations and Functions courses in the 70s. Unlike English the decline in

Figure 29

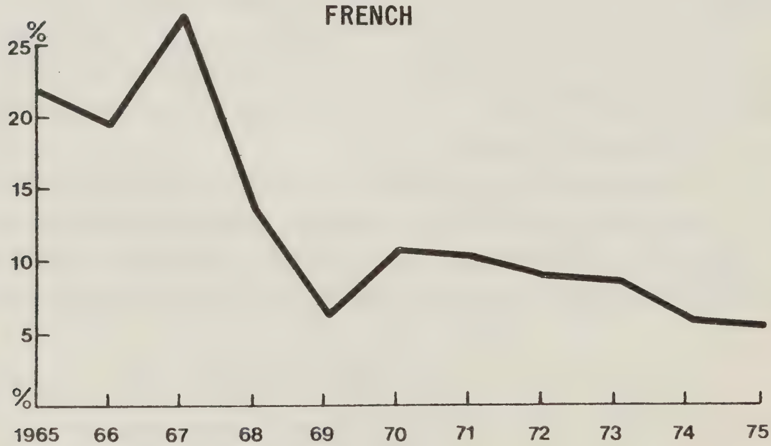
PERCENTAGE OF YEAR 5 STUDENTS RECEIVING LESS THAN
50 PER CENT FINAL MARK IN 8 SELECTED SUBJECTS, 1964/5-to 1974/5



ENGLISH



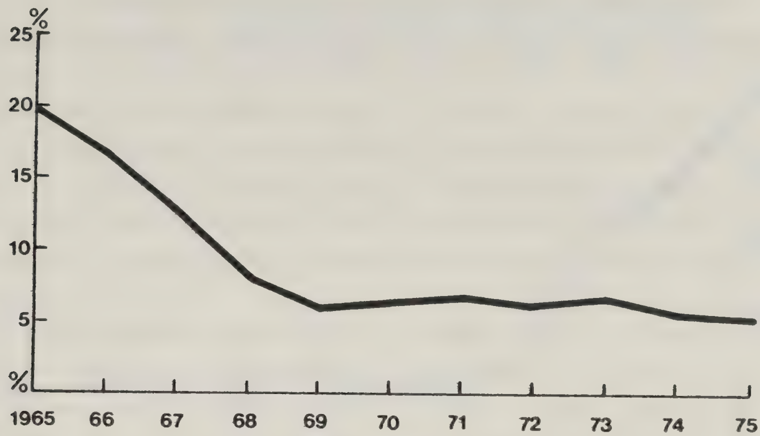
FRENCH



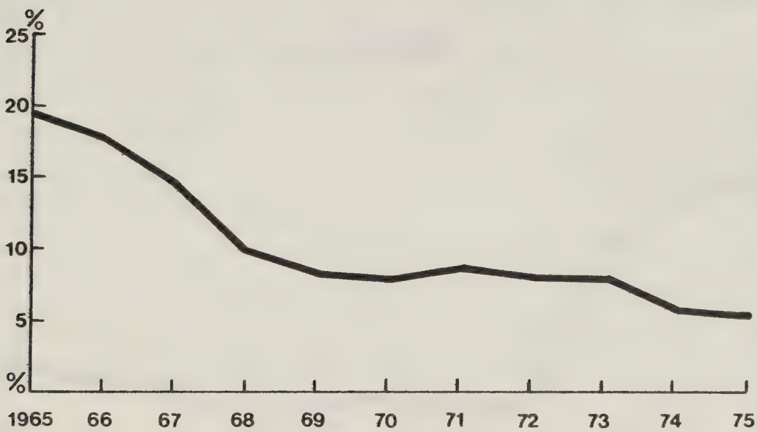
MATHEMATICS

Figure 29 (Cont'd)

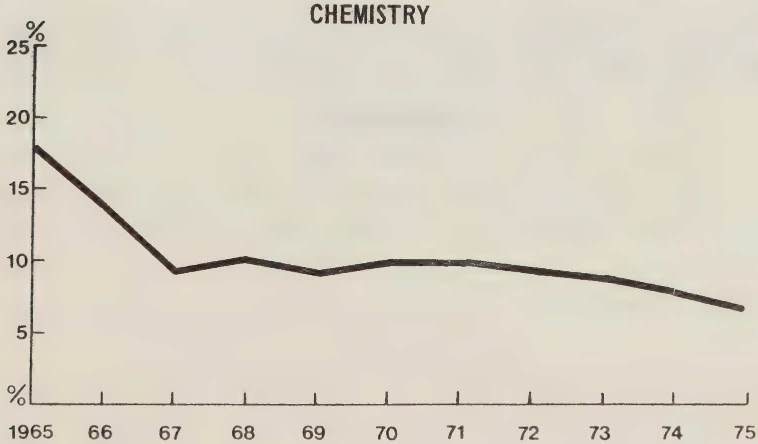
PERCENTAGE OF YEAR 5 STUDENTS RECEIVING LESS THAN
50 PERCENT FINAL MARK IN 8 SELECTED SUBJECTS, 1964/5 TO 1974/5



BIOLOGY



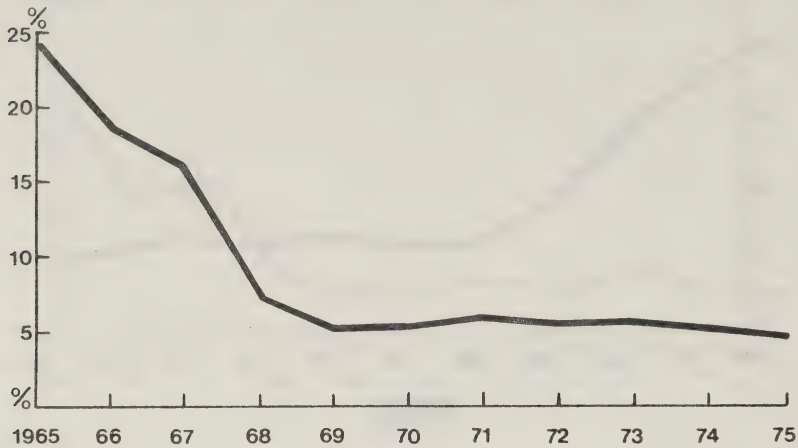
CHEMISTRY



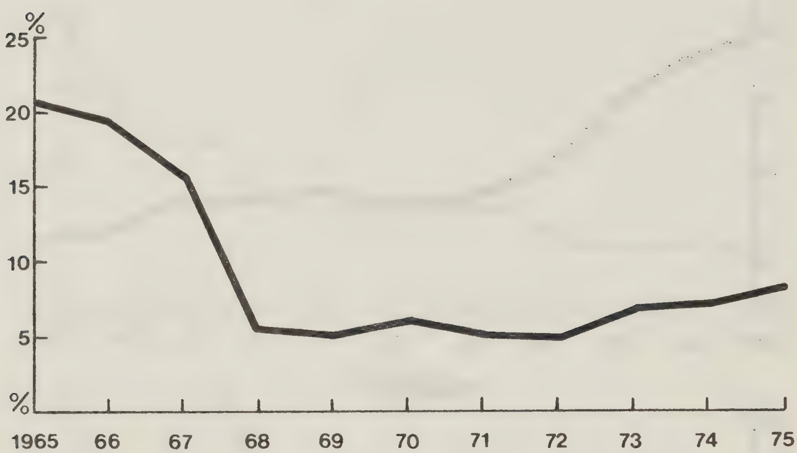
PHYSICS

Figure 29 (Cont'd)

PERCENTAGE OF YEAR 5 STUDENTS RECEIVING LESS THAN
50 PERCENT FINAL MARK IN 8 SELECTED SUBJECTS, 1964/5 TO 1974/5



HISTORY



GEOGRAPHY

mathematics failure rates continues up to the present but the proportion of students obtaining a mark of more than 70 has increased from under 40 percent to over 50 percent in 1975.

The student achievement pattern in physics, biology, and chemistry is very similar to that for mathematics; the average mark continues to increase (4 percentage points in math, 2.5 percentage points in chemistry, 2.4 percentage points in biology and 3 in physics); the failure rates decrease; and, the proportion of students obtaining a mark of more than 80 increases.

French enrolments have declined markedly but it is still surprising to note the remarkable inflation that can be seen in students' French marks, not only in the 1960s but in more recent years. Since 1970 the average mark in French has increased 9.5 percentage points, the failure rates have declined so that only one in 50 students fail and nearly 60 percent of the students obtain a mark of over 70 percent.

History, also, has suffered declining enrolments, but this appears to have had little effect on the mark distribution. In the past six years failure rates have declined only slightly and the average mark is up only 1.5 percentage points. As Figure 30 shows, the pattern for geography is very similar to that for history.

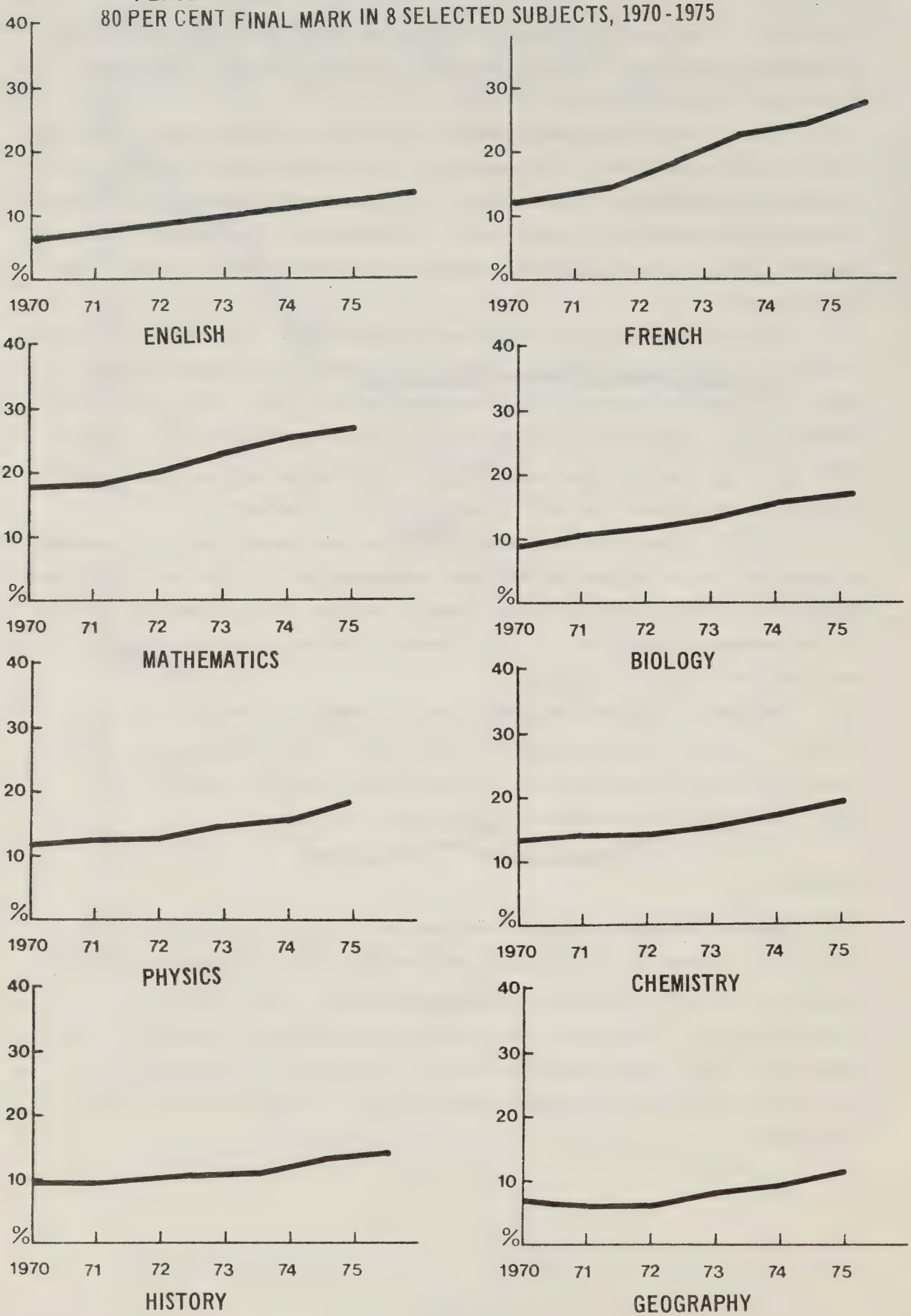
Enrolment figures were quite low for Français in the 1960s and have not increased substantially in the 1970s (1,657 students in 1975). Failure rates are extremely low at the present time and students who select this subject are quite confident of success.

COLLEGES

Our attempt to obtain information on trends in student achievement in particular courses in the colleges was defeated by the great variety of procedures used to evaluate students and the near total absence of summarized data. We discuss these grading patterns and summarize major changes that have taken place in student achievement on the basis of the perceptions of course supervisors at the 15 colleges sampled for this study.

Figure 30

PERCENTAGE OF YEAR 5 STUDENTS RECEIVING OVER 80 PER CENT FINAL MARK IN 8 SELECTED SUBJECTS, 1970 - 1975



Since their creation, the colleges have experimented with nearly every conceivable grading policy in an effort to achieve the most effective method of evaluation and grading. The type of grading system used by a college has been influenced by:

1. the grading systems in use in other post-secondary institutions both in Canada and the United States
2. the popularity of educational "innovators" who regularly tour the country promoting some new grading system
3. faculty pressure to adopt or reject particular plans
4. employer pressure to have the colleges do some initial screening for them through the use of their grading system
5. students who, like faculty, exert pressure to adopt or reject particular plans
6. administrators who seek the best system to satisfy all pressure groups and maintain efficiency in record keeping.

There has been no formal liaison on a continuing basis among Ontario's colleges on the issue of evaluation and grading. In 1974 St. Lawrence College, under the auspices of the Ontario Colleges Committee of Registrars and Admissions Officers, conducted a series of studies on grading systems in use in Canada's universities and Ontario's colleges. The study also explored the acceptability of various grading systems by university and college admissions officers and by employers of university and college graduates.*

Our study of evaluation and grading policies, conducted in 1976 at a sample of Ontario's colleges, found that 8 of 15 colleges used some variation of the traditional ABCDF system and 5 colleges used grade point averages while one college used percentages and one college used the Honours-Pass system.

Use of more than one grading system was allowed in only two of the colleges. In both cases the alternative grading system was "satisfactory-unsatisfactory".

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*Report of the Standing Sub-Committee on Evaluation and Grading of the Academic Committee of St. Lawrence College of Applied Arts and Technology, Aug. 1974.

In determining the grade point averages the colleges most often used percentages or letter grades for individual courses and converted them to grade point equivalents.

Twelve of the colleges had experimented with other grading systems before arriving at their current grading policies. The change to the grade point average system has been caused by: (1) the introduction of the computer which has made calculation of GPA's easier, and (2) the computerized recording of student records which has made it desirable for colleges to have internal consistency in grading policies. Some colleges see the standardization of grading systems as a reduction of departmental autonomy. While most colleges insist on a common grading policy throughout the institution, it is common practice for individual faculty members to use their own choice of evaluation and grading systems within their subject areas as long as grades are eventually recorded in the prescribed manner for college records.

It is interesting to compare our analysis of college evaluation and grading policies conducted during the summer of 1976 with the one conducted by the Academic Committee of St. Lawrence College in 1974. In the latter study it was found that 60 percent of the colleges sampled used more than one grading system. The stabilization that has occurred in the past two years is directly related to the introduction of computerized student record systems.

Our information on patterns of student achievement has been obtained primarily from interviews conducted with course supervisors (deans, department chairmen, coordinators) and registrars from the sample of 15 colleges. A number of factors seem to be operating here. Student attitude and motivation have improved but at the same time there is a decline in mathematics and English skills. Final examinations have nearly disappeared from the colleges and some form of continuous evaluation has been implemented. This approach to student evaluation appears to have influenced the distribution of marks. Those students who are willing to put forward the effort tend to do quite well (more A's and B's are allotted) and the intermediate group (C's and D's) declines. In general the respondents from the colleges stated that more students were receiving higher marks and fewer students were failing.

There is less formal screening through marks and more referral of students for remediation and course changes to avoid failure. The grade inflation was more pronounced for English and physics than mathematics.

UNIVERSITIES

Marks were recorded in many different formats in universities before the advent of computer recording procedures in the early 1970s. We had hoped to obtain trend data from the 1960s but very few universities had this information available in an easily retrievable form. We suggested representative years but found that in some instances it was just as easy for a university to provide us with all the years they had available on computer tape or disc. In some cases mark distributions were available for all first year courses and in others for just the courses in which we expressed an interest. The discussion that follows is based on representative tables from five universities (we received student marks from eight universities but the format varied so much from institution to institution that we chose to present 5 that were most compatible and most represented the overall trend). We consider some subjects by institutions (English, French, mathematics, physics, and history) and then look at student achievement patterns in first year courses across the sample of universities (Table 9.4).

There is very little evidence of mark inflation in English in the 1960s but failure rates tended to be higher and the proportion of students receiving higher marks lower in the late 1960s. (This included adjustments to the data necessitated by the introduction of new mark categories.) However, there is a marked increase in the proportion of what might be called "Bs" and a corresponding decrease in the number of "Cs" and "Ds" throughout the late 1960s and early 1970s.

The percentage of "As" in French has increased but failure rates have remained much the same. The pattern of more higher marks being assigned is not nearly as pronounced as that obtained for the secondary schools.

The general trend in mathematics is for failure rates to decrease and the percentage of "As" to change very little from the late 1960s

TABLE 9.4

FIRST YEAR COURSES - STUDENT MARK DISTRIBUTION
(a) UNIVERSITY A

	Mark Distribution				
	A(80-100)	B(70-79)	C(60-69)	D(50-59)	F
ENGLISH					
1969/70	7.9%[a]	53.4%	30.9%	4.0%	3.9%
1970/1	13.7	54.7	24.4	4.3	2.9
1971/2	16.3	58.5	19.4	2.8	2.9
1972/3	16.9	57.8	19.4	3.0	2.8
1973/4	19.9	59.4	16.1	1.8	2.2
1974/5	13.0	54.4	24.8	3.6	2.9
FRENCH					
1969/70	13.2	48.6	29.7	6.1	2.5
1970/1	16.7	51.2	24.8	5.4	1.9
1971/2	19.7	44.4	25.1	7.7	3.1
1972/3	21.1	44.1	26.5	6.1	2.2
1973/4	23.9	48.6	21.5	3.7	2.0
1974/5	22.1	43.5	25.8	6.0	2.5
HISTORY					
1969/70	21.6	54.7	19.1	1.1	3.4
1970/1	16.9	63.2	15.8	1.3	2.8
1971/2	13.4	61.7	19.9	3.6	1.4
1972/3	11.6	54.0	26.6	3.1	4.7
1973/4	13.9	59.8	23.3	0.9	1.6
1974/5	10.5	55.7	26.8	3.0	2.8
PHYSICS					
1969/70	14.6	24.7	31.5	17.4	11.8
1970/1	20.5	33.8	25.6	12.3	7.7
1971/2	17.0	40.1	28.3	8.6	6.0
1972/3	21.6	36.0	29.2	8.5	3.6
1973/4	17.8	45.6	27.1	7.1	2.4
1974/5	15.6	39.9	34.5	7.2	2.7
MATHEMATICS					
1969/70	14.3	20.2	22.9	24.3	18.3
1970/1	18.4	19.3	22.9	20.1	19.3
1971/2	24.8	25.6	21.8	15.5	12.2
1972/3	23.6	23.0	22.6	18.4	11.6
1973/4	17.3	19.9	24.8	22.8	14.5
1974/5	18.5	21.0	22.7	24.1	13.2

[a]% of students in each mark category.

TABLE 9.4 (Cont'd)

FIRST YEAR COURSES - STUDENT MARK DISTRIBUTION
(b) UNIVERSITY B

	Mark Distribution				
	A(80-100)	B(70-79)	C(60-69)	D(50-59)	F
ENGLISH					
1970/1[a]	8.0%[c]	36.6%	48.6%		6.9%
1973/4[b]	9.0	36.1	33.4	16.6	4.9
1974/5	7.2	40.0	36.3	9.1	7.4
1975/6	4.8	31.1	40.7	16.1	7.2
FRENCH					
1970/1[a]	16.4	29.9	45.8		7.9
1973/4[b]	28.4	37.6	17.9	9.6	6.6
1974/5	19.4	37.3	26.0	12.0	5.3
1975/6	24.4	35.3	24.1	9.8	6.3
HISTORY					
1970/1[a]	4.9	26.9	54.0		14.2
1973/4[b]	5.0	34.6	30.5	17.9	12.1
1974/5	8.0	24.1	33.0	17.8	17.1
1975/6	8.3	31.2	34.9	13.8	11.9
PHYSICS					
1970/1[a]	20.5	18.9	42.8		17.9
1973/4[b]	28.0	21.0	15.6	19.6	15.8
1974/5	23.9	23.0	20.8	18.7	13.5
1975/6	18.7	20.6	23.7	18.4	18.6
MATHEMATICS					
1970/1[a]	28.5	17.7	36.1		17.7
1973/4[b]	35.1	20.5	12.5	17.9	14.0
1974/5	27.2	10.0	20.3	16.1	16.3
1975/6	23.0	18.5	19.4	17.1	22.0

[a] For 1970/1 the following mark categories apply: A(75+); B(66-74); C(60-65); D(50-59); F (below 50).

[b] For 1973/4 the following mark categories apply: A(75+); B(66-74); C(50-59); F (below 50).

[c] % of students in each mark category

TABLE 9.4 (Cont'd)

FIRST YEAR COURSES - STUDENT MARK DISTRIBUTION
(c) UNIVERSITY C

	Mark Distribution				
	A(80-100)	B(70-79)	C(60-69)	D(50-59)	F
ENGLISH					
1965/6	3.3%[a]	29.8%	32.3%	22.3%	12.4%
1968/9	2.5	46.9	34.6	9.6	6.5
1971/2	9.9	37.9	36.6	9.7	5.9
1973/4	7.5	38.3	35.3	11.9	7.0
1974/5	5.9	46.1	29.4	9.6	9.0
1975/6	9.9	44.3	31.0	10.4	4.4
FRENCH					
1965/6	14.6	43.8	33.3	4.2	4.2
1968/9	6.4	37.3	38.2	11.8	6.4
1971/2	13.7	31.5	35.6	11.6	7.5
1973/4	11.6	44.9	21.7	14.5	7.3
1974/5	15.7	40.2	28.4	10.8	4.9
1975/6	16.5	39.7	31.4	9.1	3.3
HISTORY					
1965/6	10.3	41.9	26.5	16.2	5.1
1968/9	3.3	41.8	37.5	12.4	5.1
1971/2	6.2	36.2	40.6	12.8	4.2
1973/4	4.7	42.3	34.3	9.2	9.5
1974/5	5.3	39.8	33.3	12.9	8.8
1975/6	5.3	36.9	40.1	11.4	6.3
PHYSICS					
1965/6	5.9	32.4	38.2	17.7	5.9
1968/9	11.5	34.0	22.7	20.5	11.4
1971/2	21.1	23.7	13.2	23.7	18.4
1973/4	12.5	40.0	15.0	20.0	12.5
1974/5	15.8	21.1	31.6	18.4	13.2
1975/6	11.8	26.5	32.4	17.7	11.8
MATHEMATICS					
1965/6	8.8	36.8	33.3	14.0	7.0
1968/9	11.3	25.0	15.0	25.0	23.8
1971/2	13.7	17.7	25.2	22.6	20.8
1973/4	11.1	22.2	22.2	26.4	18.1
1974/5	11.4	21.2	24.1	24.9	18.4
1975/6	7.4	28.9	32.8	16.7	14.2

[a]% of students in each mark category

TABLE 9.4 (Cont'd)

FIRST YEAR COURSES - STUDENT MARK DISTRIBUTION
(d) UNIVERSITY D

	Mark Distribution				
	A(80-100)	B(70-79)	C(60-69)	D(50-59)	F
ENGLISH					
1965/6	.0%[a]	1.3%	18.9%	50.9%	28.9%
1968/9	.5	4.8	42.7	37.5	14.5
1971/2	1.7	13.1	50.4	25.8	9.0
1975/6	3.4	27.4	40.5	16.4	12.3
FRENCH					
1965/6	.0	9.3	42.6	40.7	7.4
1968/9	4.0	24.0	36.0	24.0	12.0
1971/2	5.7	28.6	40.7	21.4	3.6
1973/4	16.5	37.6	26.6	14.7	4.6
1975/6	19.2	23.3	27.5	20.8	9.2
HISTORY					
1965/6	1.0	5.7	23.8	35.2	34.3
1968/9	.4	14.3	52.6	21.7	11.0
1971/2	2.7	21.3	45.7	22.0	8.3
1973/4	3.1	29.0	47.1	18.0	2.8
1975/6	5.2	32.9	36.1	12.5	13.3
PHYSICS					
1965/6	.0	5.8	40.3	37.2	16.8
1968/9	5.3	14.5	33.7	26.0	20.4
1971/2	11.2	8.4	26.8	26.8	26.8
1973/4	24.0	21.0	21.0	17.3	16.5
1975/6	29.2	25.0	16.6	18.8	10.4
MATHEMATICS					
1965/6	4.5	6.4	19.1	20.0	50.0
1968/9	7.0	15.0	22.0	22.0	34.0
1971/2	16.1	22.5	29.1	18.9	13.4
1973/4	18.8	24.0	27.8	21.2	8.2
1975/6	24.0	22.7	21.7	18.8	12.8

[a]% of students in each mark category

TABLE 9.4 (Cont'd)

FIRST YEAR COURSES - STUDENT MARK DISTRIBUTION
(e) UNIVERSITY E

	Mark Distribution				
	A(80-100)	B(70-79)	C(60-69)	D(50-59)	F
ENGLISH					
1968/9	3.8%[a]	31.5%	44.7%	15.1%	4.7%
1971/2	10.9	38.2	31.2	10.3	9.4
1974/5	9.5	33.0	32.5	8.0	16.9
1975/6	11.4	42.8	30.7	7.3	7.6
FRENCH					
1968/9	8.2	23.9	35.3	23.1	9.5
1971/2	17.6	35.6	26.9	12.7	7.1
1974/5	13.6	44.8	27.1	7.8	6.8
1975/6	15.3	43.1	27.3	5.7	8.7
HISTORY					
1968/9	4.1	19.7	31.7	29.0	15.6
1971/2	7.2	22.3	37.1	14.6	18.8
1974/5	5.7	19.0	30.0	22.0	23.3
1975/6	7.8	25.5	31.1	17.9	17.7
PHYSICS					
1968/9	5.2	14.4	32.0	29.8	18.5
1971/2	12.3	15.8	30.3	21.8	19.7
1974/5	12.1	24.6	31.1	19.1	13.1
1975/6	14.0	17.9	28.8	22.1	17.1
MATHEMATICS					
1968/9	11.4	14.2	17.2	23.4	33.8
1971/2	15.6	14.3	15.3	21.2	33.6
1974/5	22.8	18.8	18.6	16.9	22.9
1975/6	14.8	16.6	21.4	20.1	27.1

[a] % of students in each mark category

to the present. However, there is great variability in these data, somewhat obscuring trends. There is also evidence of response to pressure to keep marks in line with traditional patterns. Our interviews with department heads support this contention.

Physics failure rates have declined substantially in university A, but the pattern is not so clear in the other four institutions. Again there is the appearance of a "concern about mark inflation" leading to a tightening up process.

Overall history failure rates appear to be declining although there is considerable variation from institution to institution.

There is no question that in general failure rates have declined and the proportion of higher marks has increased in the 1970s. This pattern is affected, however, by normal variation from year to year, and by internal pressure to reduce the proportion of higher marks. One might expect to find the universities with the higher admission standards producing the lower failure rates and vice versa but there is very little evidence to support this hypothesis. Some universities with comparatively low admission standards have high success rates and some low. The variation is more pronounced in the universities with comparatively high admission standards. We have, therefore, a substantial inconsistency in standards from university to university, as evidenced by the above data.

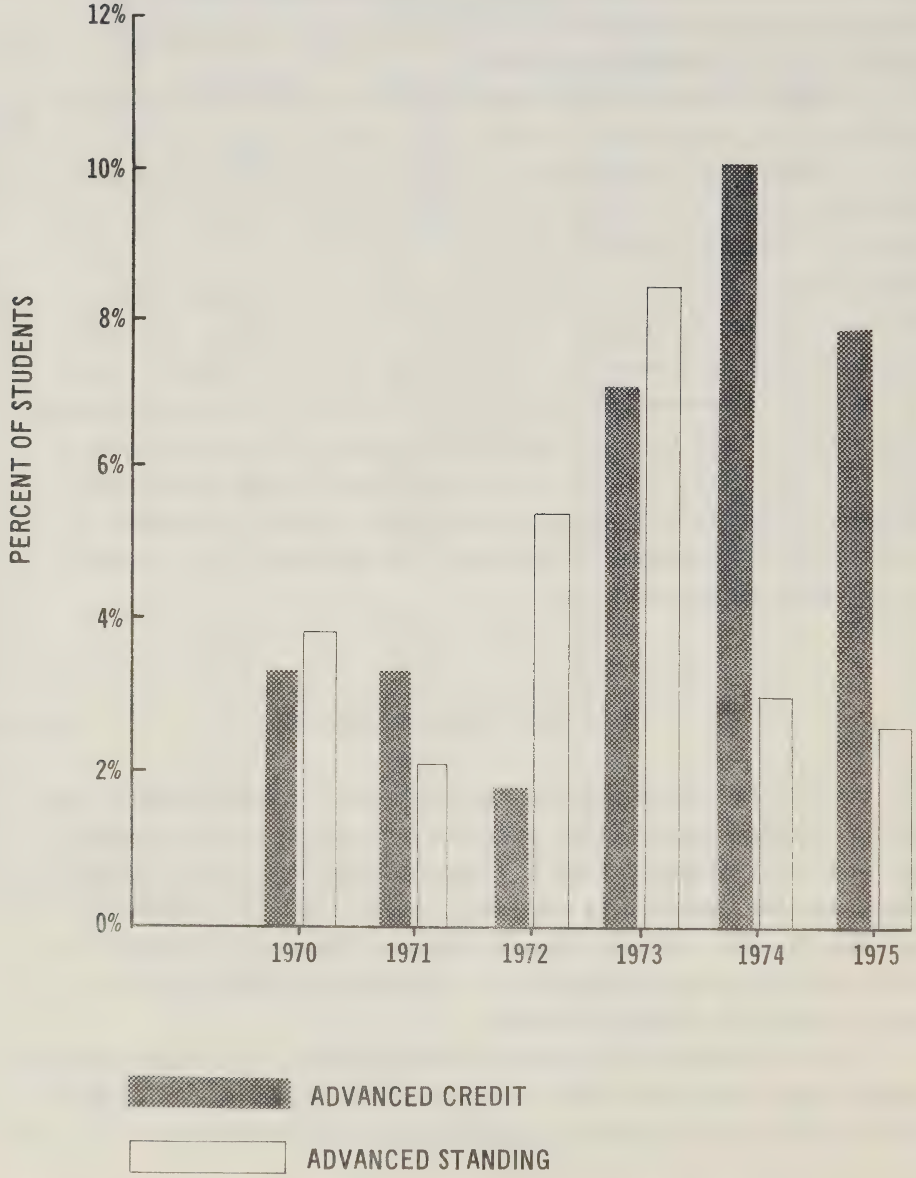
Advanced Standing/Credits

The universities do not normally recognize extra courses taken at the year 5 secondary school level except as they relate to prerequisites for particular courses. Even if a course taken at the year 5 level duplicates the content of a university credit course the student is not normally given a credit toward a degree. Typically a student is allowed to bypass what appears to be a duplication course but must make up the total credits elsewhere.

In the colleges the story is quite different. The term "advanced credit" means that the student enters the first semester of a program and receives course credits for academic work done previously. The term

Figure 31

PERCENTAGE OF COLLEGE STUDENTS RECEIVING
ADVANCED STANDING AND CREDIT (1970 - 1975)



"advanced standing" is used to indicate that the student has obtained enough advanced credits to allow him/her to enter a college program beyond semester 1.

All colleges have a policy which allows students who have successfully completed comparable academic work at another institution, be it year 5, another college, or university to receive a subject credit or, if sufficient credits are present, advanced standing. Most of the colleges in our sample (13/15) grant this subject credit based on documentation of prior academic experience. The other two require the student to prove competence through testing.

While the registrar is generally responsible for granting credits, it is normally considered an academic decision that is made by the department chairman who then advises the registrar. In most cases, the chairman will consult with an instructor in the subject area in question to determine whether or not advanced standing shall be granted.

According to data obtained from the Ministry of Colleges and Universities, the percentage of students entering college and receiving advanced standing has varied substantially since 1970, from a low of 3.8 percent of the student population in 1970 to a high of 8.3 percent in 1973 (Figure 31). Likewise, the percentage of students receiving advanced credits increased from 3.1 percent in 1970 to 9.7 percent in 1974.

These increases are a result of several factors, including the transfer of nursing students to the college system in 1973, and the increase in the number of applicants with more than the minimum qualifications.

In 1973, nursing programs (R.N.) became the responsibility of colleges. Students in the second year of the R.N. program were considered to have received enough credits from nursing schools, and thus were recorded as receiving "advanced standing" on entry to the college system. This explains to a great extent the large increase in the percentage of students receiving such advanced standing in 1973. It is noteworthy that as the nursing programs became fully integrated in the colleges the number of students receiving advanced standing decreased, so that by

1975 it was back to the 1971 level.

The increase in the percentage of students receiving advanced credits is more difficult to explain. Undoubtedly the transfer of programs such as nursing and medical laboratory technology has contributed to this. (Former students returning to school would receive advanced credits for work taken previously).

However, these increases are probably more a result of a societal perception that colleges now are a legitimate post-secondary alternative and more students with year 5 credits are applying. This is especially true with regard to job placement. With high unemployment and inflationary economic conditions, college programs are particularly attractive to young people seeking to enter the job market.

Admission Policies

COLLEGES

When the college system underwent major expansion in the late sixties, its purpose was to provide an alternative post-secondary experience for students who had graduated with a secondary school diploma, but who did not proceed to grade 13, and hence, to university. Following this philosophy, the admission requirement for entrance to all post-secondary programs has been the secondary school graduation diploma.

Basically, there has been little change from this policy, although there were and still are "refinements" to this minimal requirement. These early "refinements" included such specifications as prerequisites from the secondary school (e.g., mathematics and science in grade 12) and were related to specific program areas in the college (either technology or business). The purpose of such prerequisites was to ensure an adequate academic base for students entering programs where specialized knowledge would be needed.

Although at least one college specified percentage grade average and differentiated between graduates with an SSGD from four - and five year programs, the general policy was an "open door" admission to any

student who met the basic requirements.

Admission requirements have not changed significantly in the last decade, but the process by which students are selected has been refined extensively. Initially, colleges were more than happy to accept all qualified students. In the last three or four years, despite rather bleak job prospects for graduates, the popularity of certain programs has continued. A situation exists where the number of qualified applicants (with the minimal SSGD) exceeds the number of places available. Consequently the colleges have been forced to establish maximum levels of enrolment in these oversubscribed programs, e.g., nursing.

The colleges have responded with a myriad of selection procedures. One approach has been to raise the entrance qualifications by specifying percentage grade averages in certain subjects. Another approach has been to grant admission depending on the students' suitability to and chance of success in the program. Such approaches include psychological and aptitude testing, and group and/or personal interviews. Some colleges give priority to area candidates, others select students on the basis that the colleges should give preference to students who select the college as their first choice. Some colleges give preference to students whose academic background goes beyond the basic year 4. One college decides upon students by random selection of all qualified applicants.

Colleges are still quite happy to accept students who have the minimal qualifications into those programs that are not oversubscribed. They do recommend, though, that students take certain courses at the high school level.

As a result of the introduction of the credit system, the variety of students' backgrounds has increased tremendously. Consequently many colleges recommend that certain core subjects such as mathematics and English be taken at the year 3 and 4 level. Students who come with the recommended background courses are often exempted from introductory level courses. This leads one to believe that colleges are offering courses that could be completed at the high school level.

UNIVERSITIES

In 1965 the typical minimum requirement for admission to the first year of any Ontario university was an average of 60 percent on 9 examination papers. The specific subjects in which standing was required differed from program to program except that all required two papers to be English.

By 1968 applicants were required to have standing in at least four subjects carrying at least seven credits and an average mark of 60 percent.

Subjects carrying two credits were mathematics A or mathematics B if taken singly (only 3 credits if both were taken) and the usual languages; art, history, and the sciences (physics, biology and chemistry) carried one credit. While two credits in English were required for many programs, entrance to the natural sciences was possible without meeting this requirement. Those programs utilizing mathematics required year 5 mathematics.

Effective in 1971, universities required honour graduation diplomas from secondary schools, generally without regard to the subjects in which the six credits were earned. There were specified program by program prerequisites; again these generally concentrated on mathematics. By 1974/5, seven universities in the province would admit applicants to any program without a credit in English -- another four barred entrance only in a single program for applicants without an English credit.

Effective for the present academic year (1976/7) only three universities in the province will admit applicants to a program without an English credit. The number of programs requiring English at the remaining universities has increased. In addition several institutions recommend English even for those programs not specifically requiring it.

Although the minimal requirement is a 60 percent average for entry into most programs, this figure is raised when programs are oversubscribed. At least one university has never barred entrance to a student with 60 percent or more average into the first year of any program, but for some universities and particularly in restricted programs the lowest acceptable average mark has been set at a higher level.

Other factors have been added to the selection process. One university interviews all prospective candidates; interviews are used for

entry into specific programs in other universities. Portfolios are now required as part of the application for entry into some fine arts and architecture programs and auditions are often required for music programs.

Remedial Courses

COLLEGE

Fundamental changes in the organization and diploma requirements of secondary schools have affected the student entering the community college. Since the introduction of the credit system, students have entered college programs with the required year 4 diploma (27 credits), but not necessarily with the level of academic background previously expected of a high school graduate. (It is now possible for a student to receive a SSGD without taking senior mathematics, English, physics or chemistry). The variability in the background of students entering college has presented a great problem for college educators.

To cope with this situation, the college system has developed three major approaches. The first has been to provide remedial courses. These courses, covering material formerly studied in secondary school, have been developed for students having inadequate background in English and mathematics.

Few colleges have initiated these types of remedial courses. Rather, our interviews indicate that teaching masters, in designing their curriculum, now assume that students entering a program will not have the appropriate secondary school background. Consequently, most first year courses include a remedial component. The extent of remediation depends upon the characteristics of students in each class. The remedial component may be just a brief review of key concepts or may include an intensive study of those areas that would normally have been covered at secondary school.

A third approach has been to accept the fact that many first year students will not have any previous background in a subject and offer an introductory level course. This type of course is not called "remedial" and while some students may be exempted because of their secondary school

background, those taking the course will receive college credit for it. This approach has led many college people to claim that "while we do not state it publicly many of our first year courses are frankly remedial".

The last two approaches have gained popularity in response to what one registrar termed "the PR (public relations) of remediation". It is felt that the term "remedial" has a stigma attached to it. Students dislike the social stigma of taking a "make-up" course, and educators appear to dislike implying that they have failed somewhere.

There are other concerns however. Until recently the procedures used for allocating funds encouraged growth by being dependent on student enrolments. It was important for the colleges to attract and hold students for economic reasons, especially in programs of low enrolment. Equally important was the need to establish a college presence as a credible alternative to university. As enrolments increased, colleges could effectively use the argument that they were serving a need for many people. This need for applicants coupled with the secondary school curriculum changes created a situation in which colleges found it necessary to offer remedial courses, but, without the "remedial" label.

UNIVERSITIES

There is increasing concern in university English departments about the level of competence in English among the student body. However, considerable resistance to the mounting of remedial courses was expressed by several department heads. At two universities which offered remedial courses, they were not given in the English department. At three others, courses for particular groups were available. One university is providing a service course in expository writing, open to students in any year; the program has been well received.

A number of other universities are discussing or are implementing plans to provide remedial English courses for first year students who, tests reveal, require it.

In mathematics, courses providing instruction equivalent to year 5 courses are generally available. At most institutions these carry full

university credit. These are intended as make-up courses but in some universities are taken by students who have the corresponding secondary school credit.

Every university in our sample provides opportunities for assistance to students with academic problems, some more formally than others. For example one department offers a program of self-paced instruction and another makes evening tutorials available.

Some university physics courses overlap with year 5 physics in certain topic areas to act as a review and also to respond to the variation in students with weaknesses in their preparation in physics; taped lectures and the services of a faculty member are made available. Physics departments in other universities offer special tutorials to bring students up to an appropriate level.

Overall there was little real enthusiasm for the introduction of remedial courses among our sample of university department heads. Nevertheless, there was obvious concern evidenced regarding the preparation of incoming students and a variety of remedies had been implemented or were being considered.

10 Coordinating Mechanisms

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COORDINATING MECHANISMS

LIST OF TABLES

COORDINATING MECHANISMS

The purpose of this part of the study was to identify the organizations and other mechanisms (formal and informal) which function, or could function, as coordinating devices at secondary and post-secondary levels of education within each of the specified discipline areas.

Coordination was taken to refer primarily to such things as selection of appropriate materials and methods for study, and establishment of standards to be achieved in one course in order to prepare students for higher level courses in the same discipline in another institution. However, in the discussion of the educational system as a whole this definition has been broadened.

Formal mechanisms were considered to include all those set up for the specific purpose of providing coordination. They are those which have a basis in legislation or statutory structure and may be provided by principals, boards, faculties, or governments.

Informal mechanisms were considered to include those based on voluntary activities of individuals or groups.

Implicit in this study of the secondary-post-secondary interface is that the designated courses and levels are parts of a system. By definition the parts of a system must be inter-related. The need for coordinating mechanisms is not, therefore, at issue. What is at issue is the nature and functioning of what should be regarded as a distinct coordinating sub-system.

There are very real and pressing questions about deciding how much coordination should exist. There may be so much that personal freedom, self-expression, and interest in teaching and in learning are all suppressed. Some autonomy for both teachers and students is needed and is clearly incompatible with a strictly predetermined lock-step system. On the other hand, no coordination results in inefficiencies, frustrations for both teachers and students, and heterogeneity of educational activities which are often contradictory in purpose.

If there are virtues and dangers in too much coordination, and also in too little, we are in the not unfamiliar position of having to find the best possible balance. This may vary from discipline to discipline, from level to level, and perhaps from place to place. What is important is the realization that swings of the pendulum from a doctrinaire "laissez-faire" to an equally

doctrinaire "tight coordination" policy in response to the growing outcry of educators and the public are dysfunctional for both society and the individual. Coordination mechanisms there must be, and they must be adequate while still sensitive and adaptable. In essence the survey was conducted to determine whether present mechanisms had the potential to meet these criteria.

SOURCES OF DATA

The data on coordinating mechanisms were drawn from two sources:

1. The responses to a question prepared by Project I and asked of representative, randomly selected groups of teachers in secondary schools, colleges and universities. The question was: "Would you please list below any organizations or formal mechanisms that you are aware of that have been established to facilitate communications between: (i) the secondary school system and colleges (sent to secondary schools); (ii) the secondary school system and colleges (sent to colleges); (iii) the secondary school system and universities (sent to secondary schools); (iv) the secondary school system and universities (sent to universities).
   (a) First list those related to your specific discipline or program area.
   (b) List those related to other discipline or program areas."
2. Personal interviews with senior secondary school, college and university staff in selected disciplines.

The interviewer requested information about any groups, associations or other mechanisms (both formal and informal) which the teacher perceived as wholly or partially coordinating the following: (i) year 4 secondary and first year college courses; (ii) year 5 secondary and first year university courses; (iii) courses within the institution; (iv) courses between or among other similar institutions.

None of the questions was designed specifically to provide information which could be used to evaluate the effectiveness of the mechanisms listed. Nonetheless, the overall survey does provide data which raise some interesting questions about effectiveness. Comments which are evaluative in tone should be considered as tentative, but not as being simply unsupported opinion.

Procedures

The information collected by the Project I team was used to prepare a master list of general and discipline-specific coordinating mechanisms; for each mechanism the number of times teachers in the three types of institutions mentioned it was noted. Obvious repetitions were collected under categories of mechanisms, but 'bunching' was minimized.

Lists of mechanisms were classified according to the specific disciplines of English, French, history, physics and mathematics. The lists of mechanisms are presented under the headings of "general" and "English", "French", "history", "physics", and "mathematics". Data which reported the total number of questionnaires completed in each discipline area were not available. Thus the information concerning the number of times mechanisms were mentioned cannot be interpreted in terms of relative frequencies for the different disciplines.

For each list those mechanisms which were mentioned several times are given with the frequencies of mention. Those listed only once are not tabulated but are given at the end. A brief comment on each list follows its presentation.

TABLE 10.1

FREQUENCIES OF MENTION OF "GENERAL" MECHANISMS OF COORDINATION BY RESPONDENTS IN SECONDARY SCHOOLS, COLLEGES, AND UNIVERSITIES

Mechanism	Times Mentioned by Respondents in:				Total
	Secondary schools related to		Colleges related to	Universities related to	
	Coll.	Univ.	Sec. school	Sec. school	
Guidance department of secondary schools	46	76	51	18	191
Liaison and promotion departments of university	1	26	2	116	145
Visits by University professors to secondary schools	21	45		53	119
Visits (group & individual) to colleges	9		90		99
Liaison & information offices of colleges	4		75		79
Open house (university)		26		39	65

TABLE 10.1 (Cont'd)

FREQUENCIES OF MENTION OF "GENERAL" MECHANISMS OF COORDINATION BY RESPONDENTS IN SECONDARY SCHOOLS, COLLEGES, AND UNIVERSITIES

Mechanism	Times Mentioned by Respondents in:				Total
	Secondary schools related to		Colleges related to	Universities related to	
	Coll.	Univ.	Sec. school	Sec. school	
Workshops, seminars, lectures at colleges	2		62		64
Visits by college representatives to secondary schools	22		40		62
Careers night/day	3	16	24	8	51
Workshops, seminars, lectures at universities		18		18	36
Advisory board and committees (college)			33		33
Visits (group and individual) to universities by students		2		31	33
Literature (newsletters, bulletins) from universities		12		17	29
Calendar (college)			27		27
Visits by admission officers to secondary schools		11	5	10	26
Visits by secondary school teachers	7	8	6	5	26
Literature (general from colleges)	23				23
Personal contacts, informal talks, etc.	3	1	10	7	21
Professional development days	8	8	1	4	21
News media (papers, TV advertising)	1	1	18		20
Calendar (university)		18		1	19
Conferences (secondary school and colleges)	1		17		18
Visits (group and individual) to universities		16			16
Open house (colleges)	7		8		15
Admission office			1	13	14
Colleges/Faculties of Education		4	1	7	12
Literature (general) from universities		1		10	11

TABLE 10.1 (Cont'd)

FREQUENCIES OF MENTION OF "GENERAL" MECHANISMS OF COORDINATION BY RESPONDENTS IN SECONDARY SCHOOLS, COLLEGES, AND UNIVERSITIES

Mechanism	Times Mentioned by Respondents in: Secondary schools related to Coll.	Univ	Colleges related to Sec. school	Universities related to Sec. school	Total
University courses for upgrading teachers		6		4	10
Registrar's office			9	1	10
Communication by letter		10			10
Literature from university (course outlines)		9		1	10
Teachers' associations (e.g., OSSTF)		6		4	10
Conferences (general)	2	3		4	9
Contests, competitions	1	5		2	8
Workshops at secondary schools (e.g., university night)		3		4	7
Meetings of department heads (e.g., Headmasters' Council)		5	1		6
Magazines, journals		4		2	6
Registrars and secondary school guidance meetings			6		6
Visits to universities by counsellors				5	5
Professional associations			1	4	5
Liaison office (secondary school)		3	1		4
Boards of Education		2	2		4
O.I.S.E.			2	2	4
Summer jobs for secondary school students at university		1		3	4
Alumni		1		3	4
Literature from universities (results of students from secondary schools)		1		2	3
Ministry of Education		2		1	3

TABLE 10.1 (Cont'd)

FREQUENCIES OF MENTION OF "GENERAL" MECHANISMS OF COORDINATION BY RESPONDENTS IN SECONDARY SCHOOLS, COLLEGES, AND UNIVERSITIES

Mechanism	Times Mentioned by Respondents in: Secondary schools related to Coll.	Secondary schools related to Univ.	Colleges related to Sec. school	Universities related to Sec. school	Total
Ministry of Colleges and Universities Horizon Booklet	3				3
Provincial, college Registrars			3		3
Ontario School Counsellors' Association		1	2		3
Student Service (college)			2		2
Technical directors and teachers			2		2
Provincial Student Affairs Organization (college)			2		2
Ontario Community Counsellors' Association			2		2
Grade 12 summer program at universities				2	2

Secondary School Replies

The following mechanisms were mentioned once and by secondary school teachers only: student teachers from Faculties of Education; school boards; contact with publisher in subject area; University of Windsor Survey 1975; University President; donation of teaching materials from university to secondary school; Ontario Universities Registrars Association; Advisory Vocational Committee: invitations to see quality films; principals visit colleges.

The mechanisms mentioned most often (over 25 mentions out of 567)* concerning the interface with the universities were:

Guidance departments of secondary schools (76)
Visits by university professor (45)
Literature from universities (41)
University liaison and promotion offices (26)
University open houses (26)

The mechanisms mentioned most often (over 25 mentions out of 567) concerning the interface with colleges were:

Guidance departments of secondary schools (46)
Literature from colleges (23)

College Replies

The following mechanisms were mentioned once and by college instructors only: attend OBE workshops; Community liaison director; principal; outreach program; work experience; students' cultural background; apprenticeship committee; a professional examining body; committee on science at the university which acts as an advisory board to the Ministry of Education; common application form; program coordinator.

The mechanisms mentioned most often (21 mentions out of 403) concerning the interface with year 4 were:

Visits to colleges by secondary school students (90)
Liaison and information offices of colleges (75)
Workshops, seminars at colleges (62)
Guidance department of secondary schools (51)

*approx. 5%

Visits by college representatives to secondary schools (40)

Advisory boards and committees (33)

Calendar (college) (27)

Careers night/day (24)

University Replies

The following mechanisms were mentioned once and by university instructors only: government careers brochure; curriculum coordinating committee; committee of instructors of first year university; university programs taught in secondary schools; university department-instructional development (OUPID); local societies; teaching exchanges; undergraduate coordinator; secondary school community council; questionnaires; Dean's office; regional coordinator. The comment "career counselling at secondary school - poor" was made eight times by university instructors, almost half of those who mentioned this mechanism.

The mechanisms mentioned most often (22 mentions out of 439) concerning the interface with year 5 were:

Visits by university professors to secondary schools (53)

Open house at universities (30)

Visits by secondary school students to university (31)

Twenty-three respondents said "none" to describe their knowledge of mechanisms related to other disciplines.

SUMMARY OF GENERAL MECHANISMS FOR COORDINATION

The university replies showed that the university instructors thought of the university liaison departments as a mechanism (116 mentions) much more than did the secondary school teachers (26 mentions). However, the latter recognized the guidance department as a mechanism (76 mentions) much more than the university instructors did (18 mentions). This raises the question of how active the coordination is between the guidance and liaison departments.

If one combines individual mechanisms into general categories, the following rate highest in number of mentions:

Guidance departments

Informal visiting by teachers and administrators

Liaison departments

Open houses and workshops

Literature

Career nights

It is worth noting that it is improbable that any of these mechanisms would enter significantly into the areas of curriculum design and standards which have been defined as being the essence of "coordination" as used in this report. In addition, most of these mechanisms rely on individual and local group initiative; thus the extent of their use will inevitably be variable.

ENGLISH

Almost no mechanisms existed to coordinate English to secondary school and college. As one college English department head put it, "coordination with secondary schools is largely a matter of 'hit or miss'". Voluntary membership in the Ontario Council of Teachers of English and conferences seem to be the only links.

The situation between secondary schools and universities is better, with teachers from both institutions joining the Ontario Council of Teachers of English and Canadian Council of Teachers of English and some liaison through teachers attending university-sponsored conferences but one university instructor spoke of the coordinating mechanisms as "weak and limited" when put in a province-wide context. (See Table 10.2.)

TABLE 10.2

COORDINATING MECHANISMS: ENGLISH[a]

Mechanism	Times Mentioned by Respondents in: Secondary schools related to Coll.	Univ.	Colleges related to Sec. school	Universities related to Sec. school
Associations				
.Ontario Council of Teachers of English (OCTE)	1	9	b	5
.Canadian Council of Teachers of English (CCTE)		5		3
.International Reading Assoc.			b	
.Assoc. of Canadian University Teachers (ACUTE)				2
Publications				
.English Journal		1		
."Indirections" (OCTE)			b	
Conferences				
.OCTE - annual				b
.University sponsored - University of Western Ontario, Sir Wilfred Laurier University, University of Ottawa		4		1
.Reading Conference at York University			1	
Other				
.Individual initiative			b	2
.University liaison groups				b
.Literary survey (Queen's)				1
.Regional English Advisory Committee (secondary school)	1	1		
.Joint English advisory committee			1	1

[a] These mechanisms were identified in Project I questionnaires and our interviews.

[b] This item recorded only by interview.

FRENCH

No coordination between secondary schools and colleges was discovered. Modern language study is not an important part of college programs.

The Ontario Modern Language Teachers Association appears to be recognized by secondary school and university teachers as the major mechanism for coordination of French as a second language. The Ontario Association of Teachers of French is recognized to a lesser extent and mainly by secondary school teachers.

There seems to be increased effort going into development of university placement tests in French for first year students. By using these the university can discover students' weaknesses and strengths, and arrange individual study programs to bring everyone to the same level by the second year (see Table 10.3).

HISTORY

Coordination mechanisms across the year 5 and first year university interface are almost non-existent. The mechanisms found could be local initiatives.

In an interview, one university instructor confessed that the history program in secondary schools was not taken into account when planning curricula. He thought that a coordinated linear organization was not appropriate to the study of history because it was topic oriented .

A high school teacher said that there were no coordinating mechanisms, but he thought that coordination might be possible in the area of philosophy and methods of teaching history. He agreed that it was difficult to coordinate for content because of the nature of the subject. He added that secondary school students seem to find a social science approach more relevant, especially for those not intending to go to university (see Table 10.4).

TABLE 10.3

COORDINATING MECHANISMS: FRENCH[a]

Mechanism	Times Mentioned by Respondents in: Secondary schools related to Coll.	Secondary schools related to Univ.	Colleges related to Sec. school	Universities related to Sec. school
Associations				
.Ontario Modern Language Teachers' Association (OMLTA)		6		6
.Ontario Association of Teachers of French (OATF)		3		b
.Canadian Modern Language Teachers' Association (CMLTA)				1
.Canadian Association of Teachers of French (CATF)				b
.Association Canadienne de Linguistique Applique (ACCA)				1
.District Modern Language Teachers' Associations (e.g., Frontenac County Association of Teachers of French, Sudbury MLTA)				1
Publications				
.Canadian Modern Language Teachers' Review		b		
Contests				
.OMLTA - annual contest for university and secondary schools		b		b
Tests				
.University placement test - some universities only (e.g. Carleton, Queen's)				1
Conferences, Workshops, etc.				
.OMLTA - 2 per year				b
.College of Education (e.g., dialogue day by department of languages)				b
Others				
.Departmental initiative (e.g., a university undergraduate committee invites secondary school input)				b
.Boards of Education - arrange interface meetings				b
.Surveys - re interface, Glendon Hall, University of Guelph, University of Toronto				b
.Summer language school				1
.Heads of French department meetings both university and secondary school		b		b

[a] These mechanisms were identified in Project I questionnaires and our interviews.

[b] This item recorded only by interview.

TABLE 10.4

COORDINATING MECHANISMS: HISTORY[a]

Mechanism	Times Mentioned by Respondents in: Secondary schools related to Coll.	Secondary schools related to Univ.	Colleges related to Sec. school	Universities related to Sec. school
Associations				
.History heads association (secondary school)		b		
.Ontario History and Social Science Teachers Association				1
.Canadian Historical Association				b
Publications				
.Canadian Historical Review				
.Ontario History and Social Science Teachers Association Journal				b
Conferences, Workshops etc.				
.Local History Teachers' Conference (e.g., Queen's weekend)				1
.Canadian Historical Association Conference				b
.Colleges of Education (History workshops)		b		
Other				
.History fairs		1		
.Board of Education (e.g., Ottawa-Carleton History Liaison Committee)		1		

[a]These mechanisms were identified in Project I questionnaires and our interviews.

[b]This item recorded only by interview.

PHYSICS

The one mechanism mentioned throughout all three institutions (most frequently) is the Science Teachers Association of Ontario (STAO, founded in 1890) which publishes a journal and hosts an annual conference (e.g. Man-Environment Impact in Nov. '76 which is co-operatively sponsored with other associations). The membership includes teachers from secondary schools, universities and community colleges. The thrust is largely towards secondary school teachers who comprise a large portion of the membership. Currently, a subcommittee of the STAO Curriculum Study Committee is preparing a guideline for year 3/5 physics incorporating core and optional topics, and is participating in this interface study.

Both university and secondary school teachers identified the provincial contests (Sir Isaac Newton Prize, Canadian Association of Physicists, etc.), local university lecture series, and the university science days as mechanisms. Only university instructors mentioned the science fairs.

Aside from STAO, college instructors indicated no mechanisms linking them with the secondary schools.

Feedback from former students was mentioned as a general mechanism in interviews with secondary school physics heads. One secondary school department head remarked that there was "no direction from the university as to course expectations"; another commented that he "would like to see university core guidelines for first year courses".

Secondary school department heads when asked to list coordinating mechanisms listed "no effective mechanism" six out of ten times and "visits from university people" five out of ten times. One remarked that he "marked provincial grade 13 papers years back and had known what used to be expected". (See Table 10.5.)

TABLE 10.5

COORDINATING MECHANISMS: PHYSICS[a]

Mechanism	Times Mentioned by Respondents in: Secondary schools related to Coll.	Univ.	Colleges related to Sec. school	Universities related to Sec. school
Associations				
.Science Teachers Association of Ontario (STAO)	1	6	2	5
.Eastern Ontario Science Centre and branches				4
.District Science Councils and Associations (e.g. Frontenac County)				3
.Canadian Association of Physicists (CAP) Educational Division				b
Publications				
."Crucible"- (STAO)				b
.University Bulletins (e.g. University of Waterloo "Physics 13 News", SIN Science)		4		
.University of Western Ontario "Terrapin" (Math and Science)		2		
."Physics in Canada" (CAP)				b
Contests		1		
.CAP Prize Exam (Canadian Association of Physicists)		3		3
.SIN Exam (Sir Isaac Newton Prize) University of Waterloo		5		1
.Laurentian University - sec. school Physics contest				2
Tests				
.Diagnostic tests by universities (e.g. Queen's)				b
Conferences etc.				
.STAO - annual (interface a topic)				b
.Eastern Ontario Science Centre annual (interface a topic)				b
.Univ., Lectures (e.g. Carleton, Windsor)		2		1
Other				
.Textbooks				b
.Local S.S. Science Fairs (e.g. Descartes SSN)				3
.College/Faculty of Ed. summer course				b
.Ministry of Education		b		b
.University Science Days		3		3
.Science teachers visit secondary school (e.g. group from Waterloo)		1		
.Group initiative - one university invites SS counsellor to physics programme				1

[a]These mechanisms were identified in Project I questionnaires and our interviews.
[b]This item recorded only by interview.

MATHEMATICS

Generally, those interviewed said that the level of coordination was high in mathematics between secondary school and university. This seems to be so, not because of any one formal mechanism, but because of a vigorous voluntary professional society and active initiative on the part of secondary school and university teachers.

The following points summarize the pattern of coordination:

1) University teachers placed more emphasis on publications than did secondary school or college teachers.
2) Respondents from all three institutions mentioned the Ontario Association for Mathematics Education and its local chapters. In the interviews, it was discovered that this association is well organized and some of its attention is directed to the interface between year 5 and university. It seems to be the coordinating mechanism familiar to respondents at all institutional levels.
3) Some secondary school mathematics teachers have asked the university to set external exams, for example, 10 secondary school department heads requested an exam from Queen's.
4) Only the university instructors mentioned Ministry of Education guidelines in the questionnaires, although secondary school department heads mentioned them in interviews.
5) University of Waterloo Math Tests seem to be well known by secondary school teachers (based on 10 mentions in questionnaires).
6) Based on the number of times they are mentioned in questionnaires, secondary school teachers regard the University of Waterloo Math Tests, conferences, seminars and workshops, and the OAME as the major areas of communication, and place more emphasis on the first three than do university instructors.
7) There seems to be little coordinating activity between secondary schools and colleges. Only 3 kinds of mechanisms are mentioned in the questionnaires by college instructors. No mechanisms relating to the colleges were mentioned by secondary school teachers.

8) Few mechanisms were mentioned in the university responses to the questionnaires, but a wide range surfaced in the personal interviews.
9) Two heads of math departments in secondary schools designated student feedback as a form of coordination. ("Students come back and tell us what is needed.")
10) All teachers interviewed remarked that individual teacher initiative was the prime motivator for coordinating activities. (See Table 10.6.)

TABLE 10.6

COORDINATING MECHANISMS: MATHEMATICS[a]

Mechanism	Times Mentioned by Respondents in: Secondary schools related to Coll.	Secondary schools related to Univ.	Colleges related to Sec. school	Universities related to Sec. school
Associations				1
.Ontario Association for Mathematics Education (OAME)		6	2	7
.Local chapters of OAME example, Grand Valley (8 in all)		11	1	1
.National Council of Teachers of Mathematics (NCTM)		1		b
.Ontario Mathematics Commission		1		
Publications		1		1
."Ontario Mathematics Gazette" (OMG). Also "Abacus"		2	b	b
.University Bulletins: example Ontario Secondary School Mathematics Bulletin		4		b
.University of Western Ontario "(Terrapin)"		2		b
.Carleton University ("Carleton Coordination")		1		b
.OAME Chapter Bulletins				b
.Eureka (Carleton, Ottawa Mathematics Association)				b
Contests		4		
.University of Waterloo (4 mathematics contests in Ontario)		10		2
.Society of Actuaries Secondary School Mathematics Contest				b
.Canadian Math Congress Olympiad				b
Tests				
.Local external grade 13 tests - University of Ottawa, Queen's		1		1
.Diagnostic tests by universities				1

TABLE 10.6 (Cont'd)

COORDINATING MECHANISMS: MATHEMATICS

Mechanism	Times Mentioned by Respondents in: Secondary schools related to Coll.	Secondary schools related to Univ.	Colleges related to Sec. school	Universities related to Sec. school
Conferences, Seminars				
.e.g. OAME, NCTM, University Math and Science days for secondary school students at Ottawa, Carleton, Western, Queen's		8	1	3
Local Math Groups				1
.e.g. Loyalist Math Council		1		
.Carleton Ottawa Math Association (COMA)		1		
.Queen's Math Council (involving secondary school and universities)		1		
.Metro Mathematics Society		1		
Other				
.Math teachers visit secondary school		2	b	1
.Group and individual initiative		1	1	1
.Committees of math chairman of departments		1.		2
.Ministry of Education - guidelines		b		4
.Media (Math and English newsworthy)				b
.Surveys, studies e.g. Laurentian, Science Council '73, OAME				3
.Correspondence courses e.g. University of Waterloo				b
.Textbooks				1
.Boards of Education			1	
.College mathematics teachers drawn from secondary school			1	b
.College and secondary school mathematics teachers meet			b	
.Joint Mathematics Committee			1	

[a]These mechanisms were identified in Project I questionnaires and our interviews.
[b]This item recorded only by interview.

Summary

By far the largest number of respondents to the survey questionnaire listed none or only one mechanism for coordination. The data from the survey of university staff may be taken as illustrative of this. Four hundred and thirty-nine questionnaires were completed. Of these there were 397 responses indicating coordinating mechanisms in the specific field of the respondent (.9 per respondent) and 129 responses indicating mechanisms in other fields (.3 per respondent). Clearly the respondents are not well informed on the coordinating mechanisms now in place. Whether the mechanisms available would in fact be adequate is discussed in the concluding statement.

In the general mechanisms category, guidance departments, visiting back and forth, liaison departments, open houses and workshops, university department literature, and career nights are mentioned most frequently. Except for the guidance and liaison departments, these mechanisms are of the informal, voluntary type and depend to a large part on group or individual initiative. Unless the obvious was ignored by respondents, the Ministries, Colleges of Education and School Boards appear to play no part in the co-ordination at the secondary - post-secondary interface.

In the discipline specific category, the only common factor among institutions seems to be the professional societies, for example, OAME, STAO, etc. These are, on the whole, self-supporting.

The institutions play some role with guidance and liaison departments as well as open houses, workshops and exchange of literature. The extent of this coordination depends on the institutions, however.

The total number of co-ordinating mechanisms mentioned is high. However, with few exceptions, no one mechanism was mentioned very frequently. This suggests that those who are in contact with each other via any one particular route are so dispersed that the overall coordination is likely to be much poorer than might be assumed from the large quantity of mechanisms listed.

There are also marked differences in the extent to which co-ordination exists from one discipline to another. These are to be expected since the structure of mathematics or physics is much more hierarchical than is history which depends on more generalized skills. However the differences appear to be rather greater than can be adequately explained.

The Nature of the 'Interface'

In this study the primary concern is that between courses in one discipline in one type of institution and succeeding courses at a higher level in that same discipline in another type of institution. We shall, in general, concern ourselves with this restricted meaning of "interface"; but there are also important interfaces between different disciplines within one institutional level.

The coordinating sub-system has, in total, much wider responsibilities than those directly related to the secondary - post secondary interface. Indeed this can be seen in this report. Only in rare cases does one specific course interface with another specific course. Instead, a substantial population of courses at one level feeds into a substantial population at the higher level. Study of the interface must include, as it has throughout this report, an examination of the variation within these two populations. In terms of coordination there must be coordination and standardization within each level as well as coordination between the levels. Moreover, both lateral and vertical coordination must be examined, and lateral coordination which spans more than one discipline should be considered necessary to some extent. This has been shown by the analysis of history courses, and the basic research and communications skills which history teachers hope that their students will have received - not necessarily from previous history courses.

In the introduction to this section it was said that the purpose of the study of coordinating mechanisms was to determine whether those now in use had the potential to meet the criteria: adequacy, sensitivity, and adaptability. The survey has not provided evidence that present mechanisms can meet these criteria fully.

11 Discussion

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DISCUSSION

DISCUSSION

Our universities, colleges and secondary schools have been developed from widely dissimilar educational perspectives. There is no reason to expect that the transition of students from one institution to another can be accomplished without some accommodation to these philosophical differences. Inefficient articulation among these institutions further intensifies discontinuities and inconsistencies already present within each.

Each structural change that is implemented at some point in the educational system normally has far-reaching ramifications across the entire system. These are often not well understood. The data generated for this study illustrate the great complexity of the issues that have been explored and the potential danger of hurriedly developed solutions to real or imagined problems. In the discussion that follows we consider the implications of implementing certain proposals for change. We take this approach in order to make a case for a cautious, systematically conceived plan for the next steps that will be taken in response to the widespread concern regarding the present status of education in Ontario.

THE CREDIT SYSTEM

We are fortunate in that we can combine our research with that done by a large number of other researchers on the effects of the credit system. This provides us with a background against which we can project the effects of certain changes. There is no evidence that the credit system is encouraging students to remain in school longer. In fact, the reverse may be true. By a remarkable coincidence a decline in holding power of the secondary school has paralleled the implementation of the credit system. Although students now have greater freedom in course selection and vocational courses have been extended to three and four years, the proportion of adolescents aged 14 to 18 in secondary school has declined since 1972.

A number of factors appear to be involved in this trend. One that should not be ignored is a decrease in the importance assigned to education

by young people. But perhaps more important are some structural flaws which may be inherent in the credit system. Many courses are cumulative in nature (e.g., mathematics, French) and students who fail these courses can, in effect, lose a year. When students select courses beyond their capabilities and/or motivation, they not only lose a credit but must begin again with modified career aspirations. (The student failing year 2 advanced English normally retreats to year 2 general English the following year.) Our previous research in this area is reinforced by the findings of this study; and that is, a significant proportion of students do less well in the credit system than their counterparts did in the Reorganized Program. Approximately 1 in 3 of those students who began secondary school taking primarily general level courses graduate with a SSGD at the end of four years. The students that go on to the colleges are more likely to be a transitional group in that they begin secondary school by taking advanced level courses and at the time of graduation from year 4 are taking a combination of advanced and general level courses.

Also there is evidence of comparatively high failure rates in year 1 and year 2 general courses. Not only are these failure rates generally high, they vary substantially from school to school and in no predictable pattern. The attempt to individualize student programs can have the effect of obscuring the true picture of student progress.

These points are not meant to be indictments of the credit system; nevertheless, they do indicate that there are issues that must be considered before change is contemplated. For example, if a program requiring "higher standards" is implemented, the result could be an exacerbation of the problems of students taking mainly general level courses and a further decline in the holding power and effectiveness of the secondary school.

At the same time, it is difficult to conceive of a change that would have a substantial effect on the great heterogeneity of students entering programs in the colleges of applied arts and technology. It seems inevitable that a large proportion of these students must enter college from mixed academic backgrounds (advanced English with general math, advanced physics with general English, etc.) However, the accommodations to this heterogeneity would be simplified if the secondary school courses offered at each level of difficulty were more standardized across the province.

The effects of the credit system on student progress and achievement are not well understood and the above examples should make this clear.

SHOULD YEAR 5 BE ABOLISHED?

The need for grade 13 (year 5) has long been an issue in Ontario education. In fact, in the 1960s it was expected that grade 13 would be abolished; for a number of reasons, this did not take place. Our data bear only indirectly on this issue but they do indicate that such a decision should not be taken without a clear understanding of the consequences. This research has shown that there are some gaps and duplications in topic and course coverage in year 5 and first year university courses. Universities have developed a number of accommodation procedures to deal with the variation in preparation of incoming students, indicating an awareness of the problems caused by diversity. For example, year 5 equivalent courses are offered in many universities and in many first year subjects there are no year 5 prerequisites. There would be no gain in efficiency by dropping year 5 because the same types of accommodation would be necessary for students entering from year 4 secondary school. It would merely lead to a decrease in the quality and amount of preparation of students entering university.

There is no question that at the present time year 5 courses are generally well designed and demanding of students. But there are some inefficiencies in the development of courses from year 1 to 5. A refined curriculum incorporating the essential elements of the cumulative courses from year 1 to year 5 could be developed to be taught in 4 years but this process of curriculum redesign would require time. If year 5 were to be removed without supplying appropriate curricular and organizational supports, the articulation between secondary school and university would probably become even more inefficient.

STANDARDS

Logically we would expect some decline in the average level of student achievement with increased diversity in what is taught and the level of difficulty at which it is taught. Although there is substantial variation from subject to subject, this research indicates that diversity has become greater in secondary school courses over the past five years. This diversity requires teachers to make certain adjustments to accommodate the variability in preparation of their students. This concern about variability in preparation is expressed by instructors at all levels, but most heatedly by instructors at the post-secondary level. An adjustment need not influence the hierarchical development of a discipline (students can be upgraded in special tutorials, individualized learning programs, and other remedial activities) but it obviously can. The curriculum from secondary school through post-secondary institutions is flexible enough to provide opportunities and time for upgrading. This is particularly true for students moving through secondary school years 1 to 4 and on to college. The question then becomes, has this flexibility of the curriculum been successful in accommodating the diversity that exists at all levels in secondary and post-secondary institutions at the present time? The answer is not clear from our data and the data of Project II but both the perceptions of instructors and measures of student achievement on standardized tests (a clear decline in physics, but not mathematics in year 5 over the past 5 years and uncertainty with regard to English) give reason to believe that there may have been a decline in average student achievement during the past few years.

Overall the decline in student achievement is probably very slight, and is obscured by an increase in the proportion of well-motivated students showing higher and more diverse achievements. The shift away from a standardized curriculum has enabled the strongly motivated students to follow their interests more closely. It was not surprising to hear from many post-secondary instructors that "the better ones are better than ever before". However, the educational gains for these students probably do not offset the negative effects on poorly motivated students. There are fewer constraints on them and they are less likely to do well in school.

In summary then, we expect diversity to lead to great variability in student performance and a slight decline in average student achievement, and this appears to be what has happened in the past few years.

How does this finding accord with the data on student marks? If students are achieving on the average at a lower level, then why do they receive higher marks in years 4 and 5 of secondary school and the first years of colleges and universities? In the case of year 5, it is quite clear that with the removal of the external examination, failure rates dropped dramatically. This took place almost immediately. The trend recently has been to an increase in the proportion of higher marks. It has been suggested that this trend is associated with changed patterns of student evaluation (more projects and term tests and less weight on final examination) and a greater spread of marks is a logical outgrowth of this approach. Interestingly, while this pattern is evident in year 4 and year 5 secondary school, it is not true in years 1 and 2. In the early years of secondary school failure rates are at least as high as they were in the past and, as previously noted, probably have a more harmful effect on student progress. Currently, only a slightly greater proportion of students reach year 5 than did in 1964, but nearly twice as many graduate with an SSHGD.

Although students have much more responsibility for selecting a program of courses to meet their special needs, it is not until the senior years of secondary school that they are any less able to avoid failure. It has been suggested that students tend to reach too high in their aspirations in the early years of secondary school and this contributes to the substantial amount of failure that takes place. But the proportion of students taking mainly general level courses has not changed markedly since the late 1960s.

In general, university marks have risen overall and failure rates have declined. There are many exceptions to this pattern and much variation within it. In some specialized programs (engineering, law, etc.) there has been very little change in mark distribution over the past ten years. In recent years there have been downward swings in marks in institutions and particular program areas: these trends reflect a recognition and concern about the possibility of mark inflation. Although

these reversals confound overall patterns, they support the contention that standards are loosely defined in many settings and can be readily influenced toward particular ends. Surely a standard is set to serve a particular purpose, and if more thought is given to what levels of student performance should be required to indicate successful achievement in courses and programs, there would be far less preoccupation with the illusion of past stability.

Some college instructors have joined those who criticize the secondary schools for their preparation of students in basic language and computation skills. The increasing diversity in educational background of applicants to the colleges has emphasized the low level of capability of some students in certain areas. Remediation in communication skills and mathematics, whether stated overtly or covertly, occurs in each college. As with the universities, however, the general feeling is that the better students are better than ever. This is a function not only of diversity of pre-college opportunities but also of the increasing tendency for more students with year 5 credits to enter the college.

The colleges of applied arts and technology are extremely flexible institutions. They have developed a vast arsenal of techniques to deal with diversity in student preparation. They typically use the first semester of programs to bring students to a relatively common starting point for further work. Although further standardization of secondary school courses and organization would upgrade the basic skills of applicants, it would likely have little effect on the number and type of accommodation procedures required for colleges to serve their communities fully.

COORDINATION

Curricula must be coordinated if system-wide goals are to be attained. Our research indicates that the mechanisms for curriculum coordination in Ontario's secondary and post-secondary institutes are weak. In the following section we consider the roles of a coordinating subsystem, the components it is likely to need and the changes which have led to our present situation. This general framework has been augmented with the

data from course and teacher surveys to provide perspective on the adequacy of the present system.

There are at least four possible kinds of coordination. They are:

1. Intralevel within an institution
2. Interlevel within an institution
3. Interinstitutional
4. Interdisciplinary

While it is conceivable that all functions could be done well with an informal and decentralized support system, this seems unlikely. Moreover, there has been in this study widespread concern about the variation of student preparation. It seems clear that most teachers would consider that intralevel coordination (in effect, standardization processes) is too weakly developed. Moreover, the number of teachers who were unable to specify any coordinating mechanisms, or could list only one when, in fact, dozens existed, suggests that, however adequate the present system may appear, it is not reaching the majority of those in the system. A coordinating system which fails to establish comprehensive contact with all parts is, of course, a contradiction in terms.

It seems, then, from the evidence gathered in this study (and from a variety of other sources) that our coordinating subsystems within and across secondary school and post-secondary institutions may be inadequate. In this connection, it is useful to look at the historical changes discussed earlier in the report. The proportion of total resources going into coordination has, for a variety of reasons, been reduced over the past decade. At the same time the system has been growing enormously in size and in complexity (new institutional levels, such as the colleges, new courses, new programs, etc.). One of the prices of such complexity is that more, proportionately, must be directed to the coordination system. It might therefore be said that the past decade has seen a weakening of coordination when every consideration suggested the need for a strengthening.

The response to the question of coordination should be considered in the light of two potential problems, the choosing between too little and too much, and between too central and too diffuse. Although there is evidence that coordination now is weak and too decentralized, let us not

make the mistake of rushing to the potentially stifling consequences of too much coordination. A highly centralized, monolithic approach is unlikely to produce a happy and flexible solution. A careful study of the coordination systems in other jurisdictions (such as England, where a series of matriculation boards provides a pluralistic view of what should be taught and at what level) should prove very useful in the consideration of alternatives.

In brief, the mechanisms for coordinating the secondary-post secondary interface may be described at the moment as largely informal and as relying principally on voluntary initiatives. What we now have might be described as a vacant lot at the interface into which interested groups are stepping, maintaining individual pathways as best they can but with no view of an overall plan.

CONCLUDING STATEMENT

It appears that while the present level of diversity in course emphasis at both secondary and post-secondary levels has strengths, the accompanying inefficiencies have led to fundamental educational problems. These problems stem from a possible decline in student achievement and a lack of clarity of direction and purpose in many courses. In the preceding section we have tried to present a case for a full assessment of the goals of Ontario education and a well-thought-out and carefully implemented program of change where necessary. The alternative is a series of short-term "adjustments" designed to respond to obvious problem points in the system - an approach that will reinforce the uncertainty currently being experienced in the educational system of Ontario.

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